Rock Products

TRADEPRESS PUBLISHING CORPORATION
542 SOUTH DEARBORN STREET
CHICAGO

NATHAN C. ROCKWOOD, Editor CHAS. H. FULLER, Manager C. F. TREFZ, Associate Editor

Vol. XXIII, No. 2 January 17, 1920

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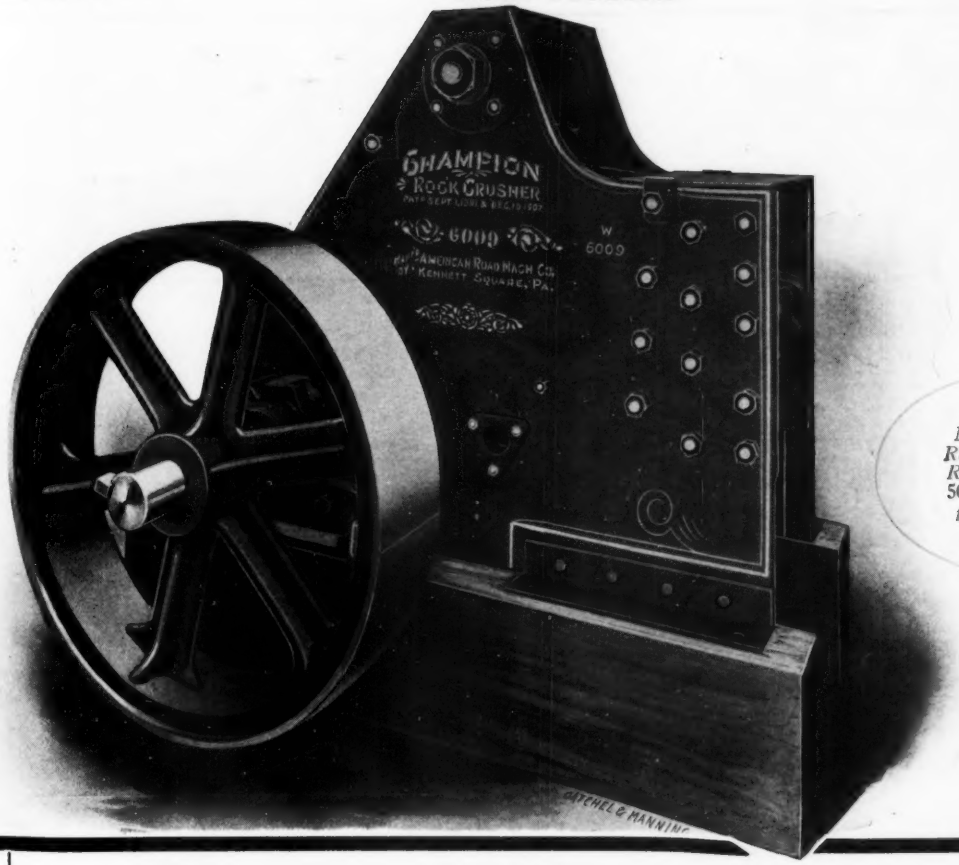

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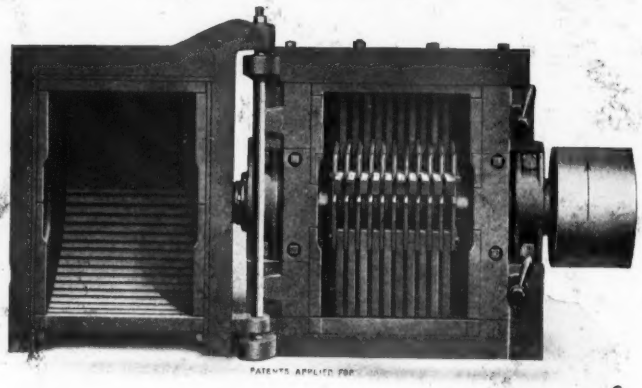

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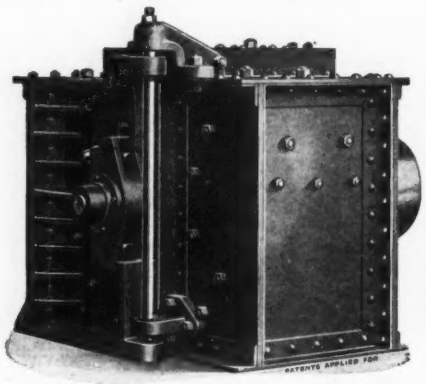

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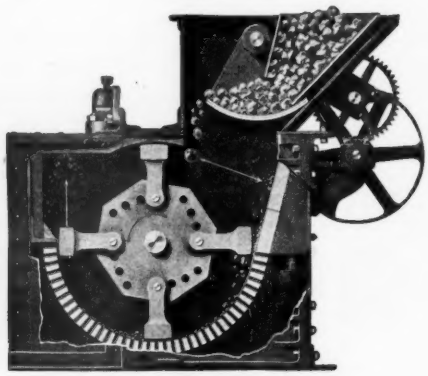

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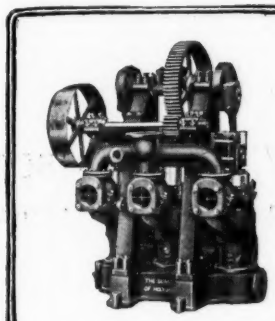

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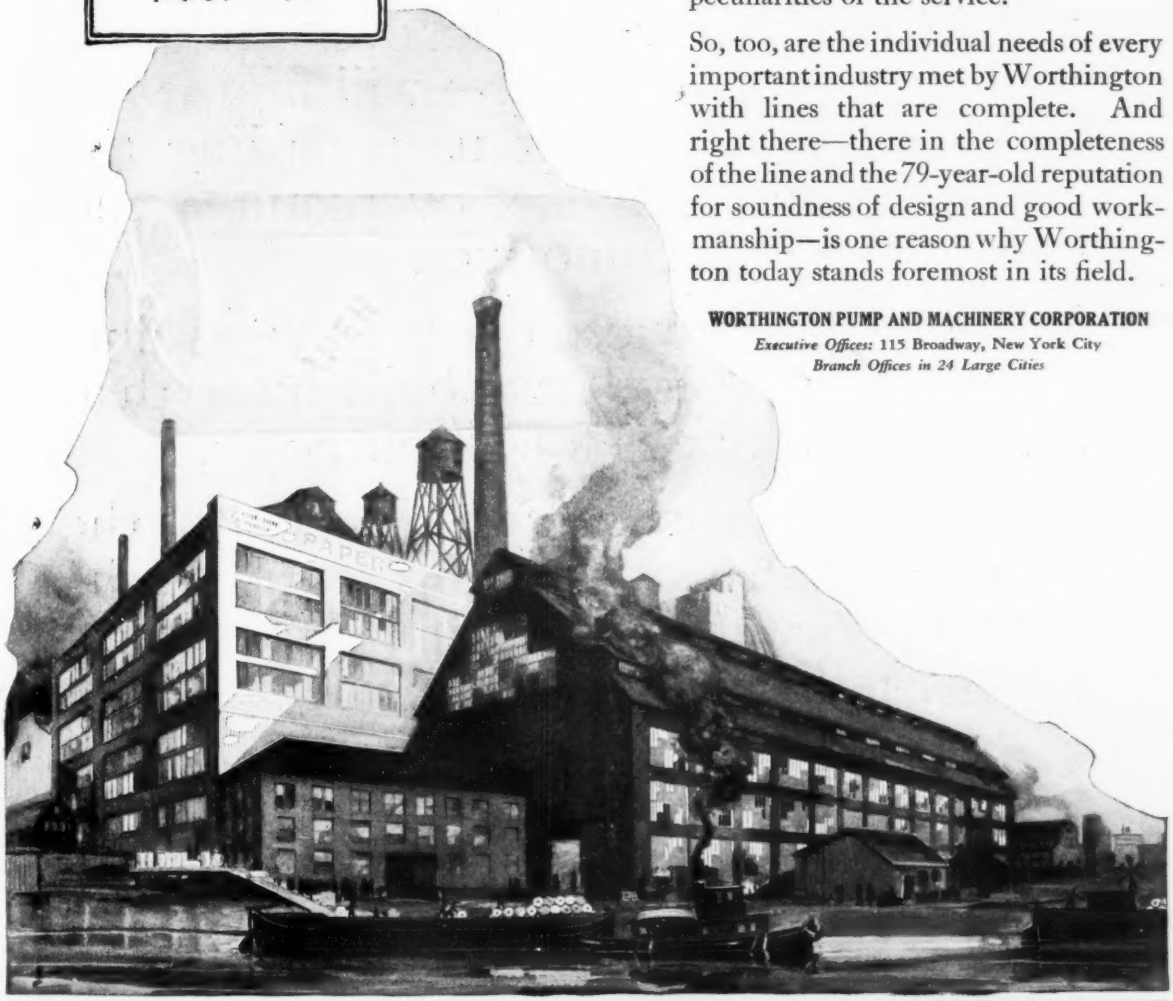

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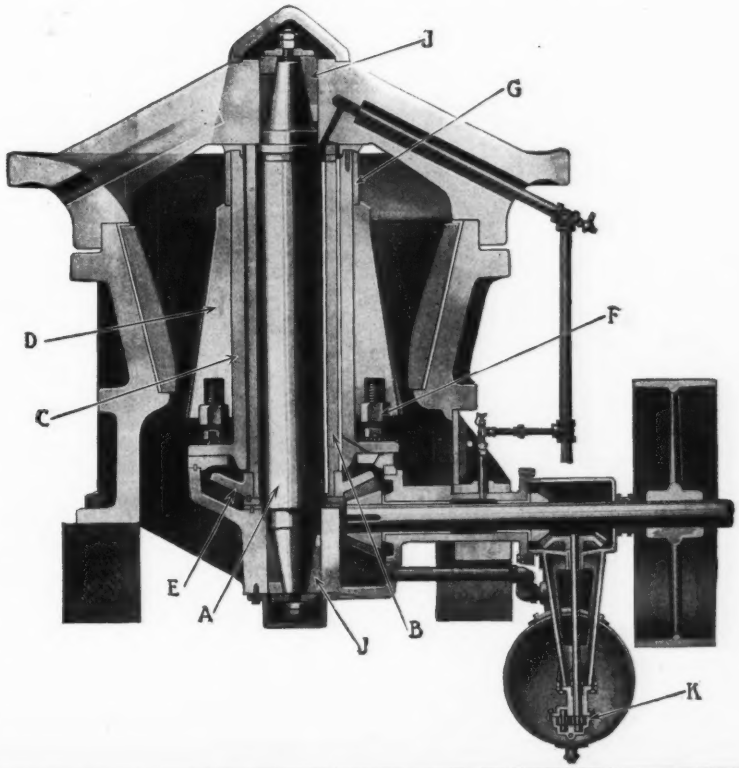

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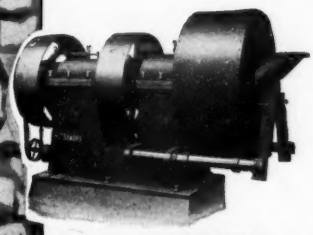

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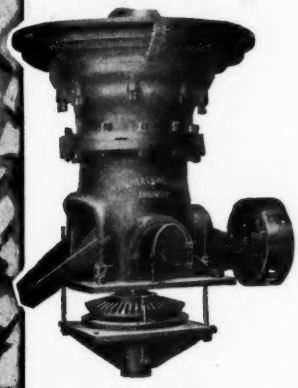

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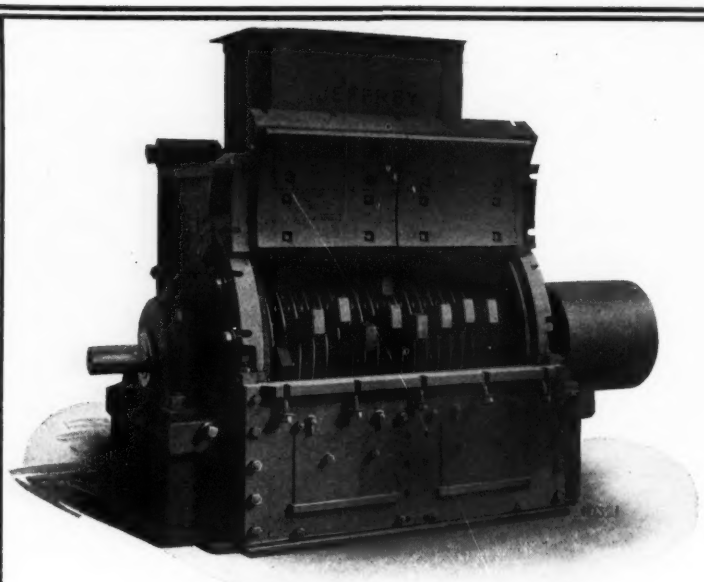

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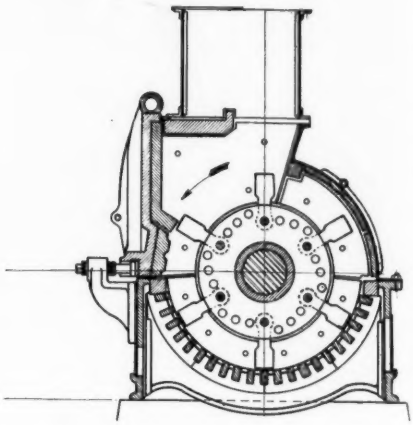

Sectional View of Pulverizer showing Top Feed

Jeffrey TYPE "B" Ball Bearing Swing Hammer Pulverizer

for Breakdown of Large Pieces of Limestone, Gypsum, Shale, etc.

Leading Cement Mills, Lime Plants, Quarries, Gypsum Plants, etc., are being equipped with Jeffrey Swing Hammer Pulverizers to meet the constantly increasing demands.

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Rock Products

Vol. XXIII Chicago, January 17, 1920 No. 2

River Sand Plant with Facilities for Winter Operation

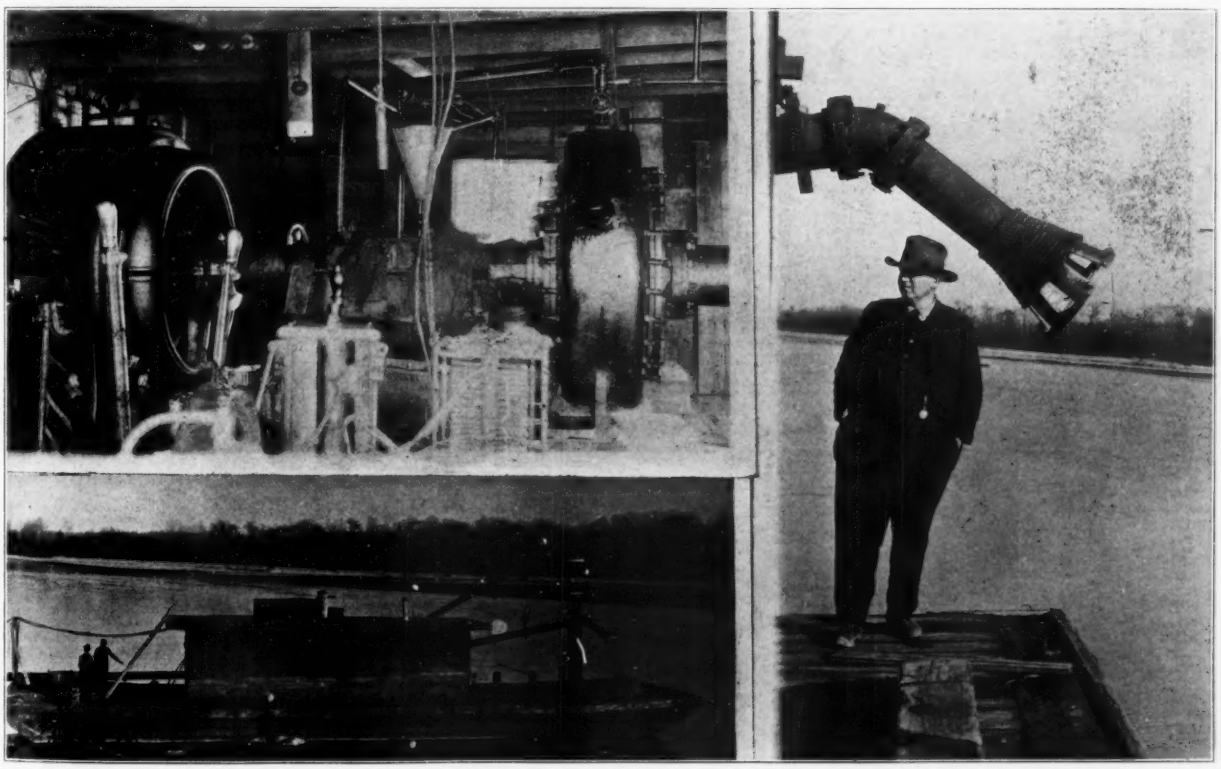
Stewart Sand Company, Kansas City, Has Just Completed New Kaw River Plant—Some Unusual Features

THE KAW RIVER is a source of a large supply of high quality, clean sand for the Kansas City market. The Stewart Sand Co., whose main offices and distributing yards are in Kansas City, operates three Kaw River sand plants. The one at Grinters Heights, Kans., on the Kansas City, Kaw Valley and Western Electric Railroad has but recently been completed, and is of more than ordinary interest because in it are found the results of some 20 years' experience in Kaw River sand-plant operation.

The Kaw River sand industry is one of interesting growth and the Stewart company is a pioneer in this development. About 20 years ago sand was obtained for Kansas City by barges and hand labor. The barges were rowed out to a sand bar in the river and laborers shoveled the material into them. Later a steam launch was acquired to tow the barges to and from the sand bars.

Steam operated sand pumps were first used about eight years ago. In the modern sand plant, the pump is electric-motor driven, the barge is replaced by a pontoon pipe line, and the sand is re-washed at a shore plant.

The Kaw River sand does not require sizing and crushing and so the shore plant is very similar to a large sand-settling box.



Upper left corner—10-in. direct connected motor-driven sand pump. Lower left corner—Floating dredge. Right—George Cook, operating engineer of the Stewart Sand Co., on suction end of dredge

Dredge Operation

The sand is excavated from the river to a depth of about 25 ft. by a floating dredge. The dredge has a motor-driven, direct-connected 10-in. sand pump, which sucks the sand from the river beds and then forces it through about 600 ft. of 10-in. pipe line on pontoon floats to the shore sand box. A view shows the suction end of the pump, which, owing to the fact that the sand is loose and that there are no large boulders, requires neither cutter nor screen. The friction head at present is estimated at about 60 lbs., and it is calculated that the 300-h. p. motor can easily pump against this and even a much greater head.

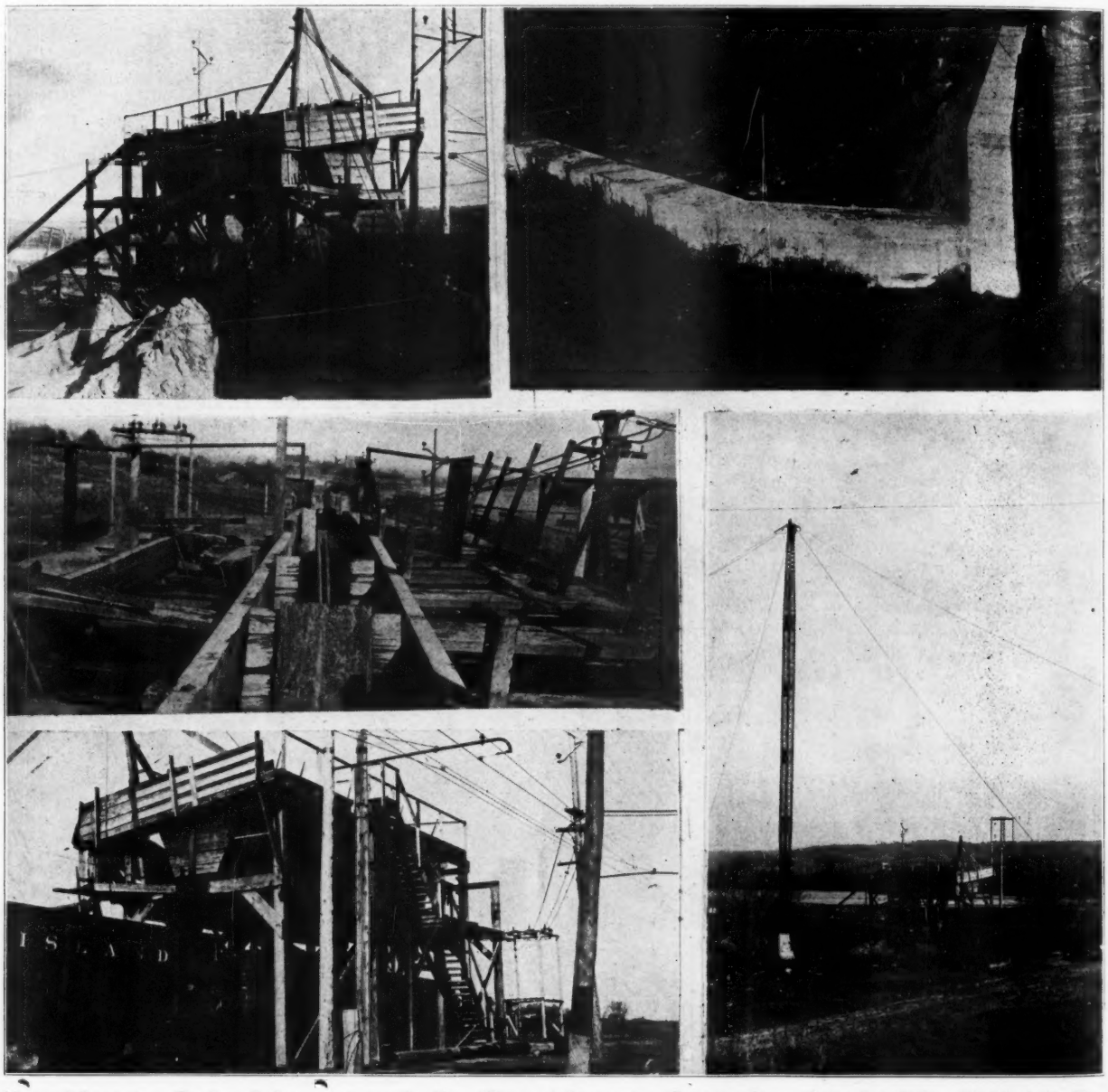
The pump is of manganese steel and the 35-lb. steel pipe used for conveying the sand to shore also has manganese steel flanges. The pump runners have a life of from one to two years in this instance. The end plates and casing generally last a little longer.

The 300-h. p. motor will satisfactorily pump sand through a maximum of 1400 ft. of 10-in. pipe line and against a vertical lift of 65 ft. maximum, equivalent to a total head of 175 ft., including the suction. The pumping plant is equipped with a recording wattmeter, voltmeter, pressure gauge and suction gauge. Its present capacity is about 35 cars of sand per 8-hr. day.

Shore Plant

The pontoon pipe line delivers the sand to a trough 20 in. wide and 18 in. deep which extends across the top of the sand tank. At intervals along the bottom of the trough there are bar screens which reject sticks and floating stuff and stone over ½ in. size. The flow of the water and sand through this trough is somewhat retarded by heavy swinging wooden gates or baffles, hinged from their tops in the trough just in front of each bar screen. These gates prevent too much of the sand from washing by the bar screens into the waste flume.

Only sand less than ½ in. can get through the screens. The oversized is washed on down to the waste end by part of the water. The sand and water go through the



Upper left corner—Sand tank from storage pit side. Upper right corner—Concrete box culvert for drain. Middle left—Top of sand box showing trough and wooden gates. Lower right—Revolving steel derrick for storage pit. Lower left—Loading cars from the sand tank

bar screens into the sand tank, where the sand settles and the silt and dirt overflow into a flume at one end of the tank.

In event that the bar screens should become clogged by sticks and leaves, a horizontal gate underneath the screen is provided so that by closing the gate for a few minutes all material will be washed off of the screen into the waste flume.

Concrete Settling Tank

The views will give a good idea of what the sand tank looks like. It is merely a large wooden bin so constructed that cars may run underneath it to be filled. The tank is just the length of a car and by use of the eleven slide gates a car may be uniformly loaded without moving it.

Sand from the settling tank may be loaded either directly into cars or diverted to a large storage pit which is at present under construction.

Winter Storage

This storage pit, when completed, will have a capacity of 25,000 cu. yd. and will be filled for winter trade. It is 180 ft. in diameter and 25 ft. deep. The pit is being excavated by the hydraulic method. The dirt in the bank is loosened by shots of dynamite and then the stream of water from the flume is turned upon it. A reinforced concrete box culvert in the bottom of the pit conveys the dirt and water to a small creek which runs through the valley. Later this culvert will be used to drain the water from the sand stored in this pit.

A revolving steel derrick with a 90-ft. boom is mounted on a concrete base in the center of the pit. A 3½-cu. yd. clamshell bucket will be operated from this derrick and will be used to load the stored sand into cars.

A sand bin of one car capacity will be built over the loading track, and the sand will be moved by the derrick-operated bucket from storage to the bin rapidly so that cars may be loaded by gravity. It is expected that this pit storage will take care of all winter trade.

The new plant has been designed by John Prince, president of the Stewart Sand Co., and George Cook, operating engineer of the company.

Wide Interest in National Sand and Gravel Association's Convention

"WITH THE NEARING of the date for the National Association of Sand and Gravel Producers' Convention to be held in Chicago, the enthusiasm and interest of gravel men over the entire country is approaching white heat," says the chairman of the 1920 convention committee. This statement is based upon the returns from men who are interested and who state that they will be in Chicago on February 11 and 12.

These returns indicate that not only will all the members who have attended previous conventions turn out 100 per cent strong, but that there will be an unusual number of new members present. Last year there was in the neighborhood of 200 in attendance and this year a growth of 25 per cent is estimated. That will mean that 250 producers will take part in the national activities of their industry this year.

Among the many helpful suggestions that have been made to the committee by interested members are the following: that time be allowed at the convention for discussion of operation problems; that there be discussion of certain activities which the association should take up and that there be a national movement to eliminate discriminatory practices of the carriers in the application of demurrage rules to the coal mine operation.

Just as this issue goes to press, word comes from E. Guy Sutton, secretary of the Association, that the coal operators are working strenuously to have the car service rules applying to their industry during the war period perpetuated indefinitely. There is a provision in the Cummins bill to this effect.

It is the full intention that this convention shall be primarily a time for discussion and exchange of ideas relative to the practical plant operations. One of the special features will be papers delivered by practical men on their methods of operation.

There is a possibility that it will be decided at the convention to employ a traffic expert as an aid to the shippers of the national association. The duties of such an officer would embody the collection of shipping rates from all over the country. He would stand ready to be of aid to any member in the determination of individual rates and would be of assistance in any railroad problem.

The question of demurrage is an important one and much work has already been done with it. If the National Association could succeed in obtaining in a measure the same rulings for sand and gravel producers that the coal mine operators now enjoy, a great step would be made in the solution of shipping problems. And since sand and gravel men have practically the same conditions and problems to meet in shipping that the coal men have, there is belief that this end will be accomplished.

Two very recent acts of recognition have proved that the National Association is considered an influential organization and that it represents an important national industry. E. Guy Sutton, secretary, was called to Washington on January 5, 1920, by A. G. Gutheim of the Car Service Section, Railroad Administration, for a conference on proposed railroad legislation.

The American Society of Testing Materials has selected a committee to investigate and report on standard sizes for sand and gravel to be used over the entire United States. Prof. T. R. Agg, Iowa State College, is chairman of this committee and E. Guy Sutton, as a representative of the association, is also on this committee. It is very evident that the producers of the country will be greatly concerned with any such standardization and it is well that they are represented upon the committee. This has been possible through a national association.

One of the papers to be delivered at the Chicago convention will be by Professor Agg, upon the subject of standardization of sizes and specifications for sand and gravel.

It is urged by the 1920 convention committee that all producers who are interested in these many problems be on hand to present their views and aid the activities which will support the producer's side of the issues.

The Illinois Sand and Gravel Producers' Association is in Chicago meeting as this issue of ROCK PRODUCTS goes to press. The Ohio Sand and Gravel Producers' Association will meet in Columbus January 20 and 21. The Missouri Valley Association of Sand and Gravel Producers will meet in Kansas City, Mo., January 19 and 20. All these meetings will bring up important issues to be taken before the national meeting in February. The next issue (January 31) will contain reports of all these local meetings.

California 1920 Road Funds

CALIFORNIA greets the new year with $70,000,000 available for good roads construction, according to Ben Blow, Manager of the Good Roads Bureau of the California State Automobile Association.

Eleven counties have voted bonds since May, in addition to the $40,000,000 good roads bond issue and $400,000 voted in Modoc County for the establishment of engineering grades, bridges and culverts. In voting this large sum for new construction, California has established a national record which will stand for some years to come.

Some Phases of the Present Day Freight Rate Problem

Ben Stone Before the Indiana Sand & Gravel Producers Association, Indianapolis

WE ARE EXPECTING another rate advance, and a great many have already said the industry cannot stand it; but before we undertake to survey the situation confronting us today, I want to take you on a little trip into the not far distant past to see if we cannot discover some of the influences that caused our present affliction to be visited upon us.

Origin of Gravel Freight Rates

It has been only within recent years that the business of producing sand and gravel has developed into an industry of more than local importance. Formerly, each producer's market territory was confined to nearby stations on a railroad that served his plant. It might be said that his freight rate then was an individual affair between himself and the traffic department of the railroad. No other producer was concerned, nor was any other road concerned, except in comparatively few instances, where two or more roads reached a common point with sand or gravel traffic, and then more often than otherwise the rate competition was stronger among the carriers than among the producers.

It was not uncommon for producers, with the air of contractors, to seek special rates when some particular amount of tonnage was involved, and such rates were frequently granted by traffic officials against their better judgment because of their anxiety to provide traffic for equipment that might otherwise be idle. Almost every producer who was operating prior to the war has certain rates that are regarded by others as being monopolistic. It might be said that there has never been any well defined basis or principle for making rates on our commodities beyond what it was thought the traffic would bear. Producers have shopped with the carriers persistently, although not at all times consistently, for preferential rates, and the carriers have often shopped among producers, offering specially favorable rates and other inducements to have certain deposits worked. A great variety of arguments were built up in justification of low rates. Then in later years, when the roads began trying to get all rates up, it became a game of wits, and many conflicting influences developed.

THIS IS A STRAIGHT-FROM-THE-SHOULDER PUNCH at the railway problem. Mr. Stone has been a railway man and sees both sides. Emphatically, this is not a justification of present or higher freight rates on sand and gravel. It is a frank statement that sand and gravel producers must do something more than raise a howl to ward off further increases. Mr. Stone is already familiar with rates paid by many Illinois operators and he is satisfied that the ton-mile revenue derived from sand and gravel traffic can be proved to be much higher than the ton-mile revenue on other commodities. Not until this is done, have the sand and gravel producers, generally, a leg to stand on.—Editor.

The Harvest of Old Rate Practices

These past practices have contributed to a most unsatisfactory situation, one very undesirable phase of which is the disposition on the part of carriers to regard sand and gravel business as a sort of tramp traffic, to be handled at will or at their own convenience and too often, when they have nothing else to do.

But the principal result, and the one most difficult to overcome, is that there has been built up a structure of rates on sand and gravel where in, generally speaking, there is no definite relationship of any one rate or group of rates to any other rate or group. In other words, there is no definite relationship, and in that respect sand and gravel rates are unlike those on almost any other commodity I know of.

Although we frequently refer to certain relationships as being differentials, I believe I can say without fear of contradiction, that there has never been considered either by shippers or carriers, any definite differential basis in the making of rates on sand and gravel.

The term "differential" in traffic contemplates a rate relationship, fixed and guaranteed either by custom or a tariff publication.

There are, it is true, at some common points relationships so called while they last, as between or among the rates published by individual roads reaching those points; and there are also on some roads more or less definite and recognized relationships as regards traffic moving in the same direction from two or more given points. But there never was any guarantee or understanding that such relationships would not be disturbed, and the general custom followed by practically all carriers in the making of rates and all shippers in the seeking of rates has indicated that there has been no disposition on the part of anyone to respect such relationships as differentials.

So much for the past. When viewed without prejudice the conclusion must be that methods and practices used in negotiations for freight rates have not only served to build up a rate structure that is a masterpiece of cubist art; but that they are responsible in large measure for the present-time attitude of the carriers as regards the desirability of sand and gravel traffic.

Rate Advances and Results

We all know what happened to our rates under General Order No. 28. We also know what happened some months later when the railroad administration proposed to promulgate a schedule of distance rates for our commodities. The former was accepted as a war measure; the latter met with such vigorous protest against the principles involved that it was abandoned.

As the building season of 1919 advanced, there was set up a great agitation for a reduction of the rates authorized by General Order No. 28, it being universally proclaimed that the sand and gravel industry would not carry such a burden.

The only noticeable result of this widespread agitation was a considerable delay in getting the country's building program started, and with due regard for all that was said at that time about our rates being unduly burdensome, it remains a fact that we have gone through the year and have carried the load without any apparent fatigue.

We are now approaching another operating season. Anticipating another general advance, we are again clamoring for a reduction on the ground that the present rates are too high, and that a further advance would be confiscatory.

You may rest assured, gentlemen, that the carriers in preparing their application for additional revenue, will not be unmindful of the national agitation last year for lower rates and the seeming ease with which we took that hurdle.

This is not an argument for higher rates—far be it from such. I have repeatedly asserted that I believe present rates are too high. But have we not indicated to the carriers that we do not know how far they may go in the matter of increasing gravel rates before transgressing the law of diminishing returns. And have they not shown by every act and statement that they do not know, themselves?

Agitation Without Facts Useless

I will venture the observation that except for the general understanding that rates authorized by General Order No. 28 were in the nature of a war measure and intended to discourage traffic, that predictions of disaster to the industry would have been just as loud among producers as they have been at any time since, and I have a very firm opinion that a general agitation protesting against the anticipated increase, or for a lowering of the present level unless supported by absolute facts, will do more harm than good.

Now, gentlemen, let us meet this issue squarely. We all know that the railroads must have more money in order to provide the service that will be required. Talking recently with Superintendent Bradt of the Illinois Division of Highways, I expressed the opinion that in the final analysis, the production of materials during the next few years would be governed by car supply and transportation service.

I know there is not a man among you who would have the railroad handle this traffic for less than the service is worth, but how many of you know what the service is actually worth, or what your own traffic can afford to pay? How many could say, under oath, that present rates give the carriers full value in return for services rendered? Who is there among us that could go before the commission and state under oath just what would be the effect on his business, on the industry at large, or on any particular group of plants, of an additional 5 or 10 cents per ton on his freight rate?

It is said that ours is one of the foremost of basic industries—no one need trouble to prove that—we admit it. So why not get away from the theoretical, speculative and problematical phases of this important factor in our business and by making it a straightforward, clean-cut business proposition, put the sand and gravel industry where it belongs on the transportation map?

Must Collect Facts and Figures

To undertake such a step we must first determine what the traffic is now paying; then we may decide whether we can afford to pay more if necessary in consideration for the class of service we know we must have.

We cannot make a true analysis of the situation without immediate, accurate and reliable records, and each producer must furnish such information in respect of his own traffic.

I would respectfully suggest that each

Ben Stone

of you compile a statement covering all shipments made from each plant during 1919. It must show the points of destination, the distance of each from the billing station, the freight rate to each, total number of cars, total tons, total revenue, average tons per car, total car miles, the per car mile revenue, total ton miles and the per ton mile revenue with respect to each point of destination.

A very simple analysis will show the number of miles your traffic moved; the total number of cars divided into this would show the average car haul. The total revenue, divided by the total car miles, will show the average per car mile revenue, and divided by the total ton miles, will show the average per ton mile revenue. You can then state positively just what measure of revenue your traffic is paying.

An auxiliary statement showing your total plant investment, potential daily car capacity, number of days operated, average number of cars loaded each day and days lost on account inadequate car supply and irregular service, would also be of value.

A copy of these statements filed by each of you with your secretary would enable him to determine what the industry, as represented by your association, is paying. Also what the failure of the railroads to function properly has actually cost. Then, gentlemen, and only then, will you have something to talk about that will command for you a respectful hearing.

Present Rates Can Be Proved High

It may be that the present rates are unreasonably high—I believe they are; but it has been demonstrated that we can do business under them, and I am sure you will agree that we cannot consistently contend for lower rates under existing conditions until we can make a showing of facts to support our statements. The needs of the industry may require lower rates, for all I know; but in my opinion, the first and foremost need in the matter of freight rates of the industry at large, is a readjustment of the general rate structure, whereby there may be established a comprehensive basis of fixed and guaranteed relationships, not only as regards points of origin and destination on a single line of railroad, but in respect of the traffic handled throughout each distinct market territory. To accomplish this will require collective effort and every one must do his part.

You would then have a stabilized rate structure, under which necessary adjustments and extensions could be had on a showing of necessity, and such adjustments could be handled as individual cases; provided that the general relationships as established would have to be observed and maintained.

In conclusion, I would emphasize the suggestion that you prepare a comprehensive and detailed survey of your traffic. You will then have the best ammunition obtainable for meeting any proposal that may be made by the carriers for an increase in your present rate, and it will also serve you well in many other directions. Without it, you might as well quit talking and conserve your energies, for the next time you are called to the freight rate hospital, Dr. I. C. Commission will be the chief surgeon, and unless his diagnosis shows dire need of an operation, you will most likely be sent away with instructions to pay the fiddler.

The railroads are long on sympathy these days, but have little actual relief to offer in the nature of lower rates. The general tendency of every adjustment that has been attempted during the past two years has been upward—always higher.

Year of Progress Celebrated by Indiana Gravel Men

Annual Meeting of State Association Establishes Another Milepost in Splendid Record of Achievement

THE Indiana Sand and Gravel Producers' Association held its annual convention in Indianapolis, January 6 and 7. The occasion was celebrated by a banquet in the James Whitcomb Riley room of the Claypool hotel, at which the wives, daughters and sweethearts of the members were guests, and by a theater party afterward. This is probably the first sand and gravel convention on record to which the ladies have been made welcome and especially entertained; and it was voted a huge success.

George V. Miller Presides

In the absence in Florida of President H. C. Huffstetter, George V. Miller, of Indianapolis, was unanimously elected chairman of the convention.

In reviewing the progress of the Association in his annual report, E. Guy Sutton, secretary said:

Summary of Aims and Accomplishments

"The Indiana Association was organized about five years ago and it was the first State Association of Sand and Gravel Producers. Under the wise direction of its two most excellent presidents and with the loyal support of its members, the Association has grown steadily in strength and influence.

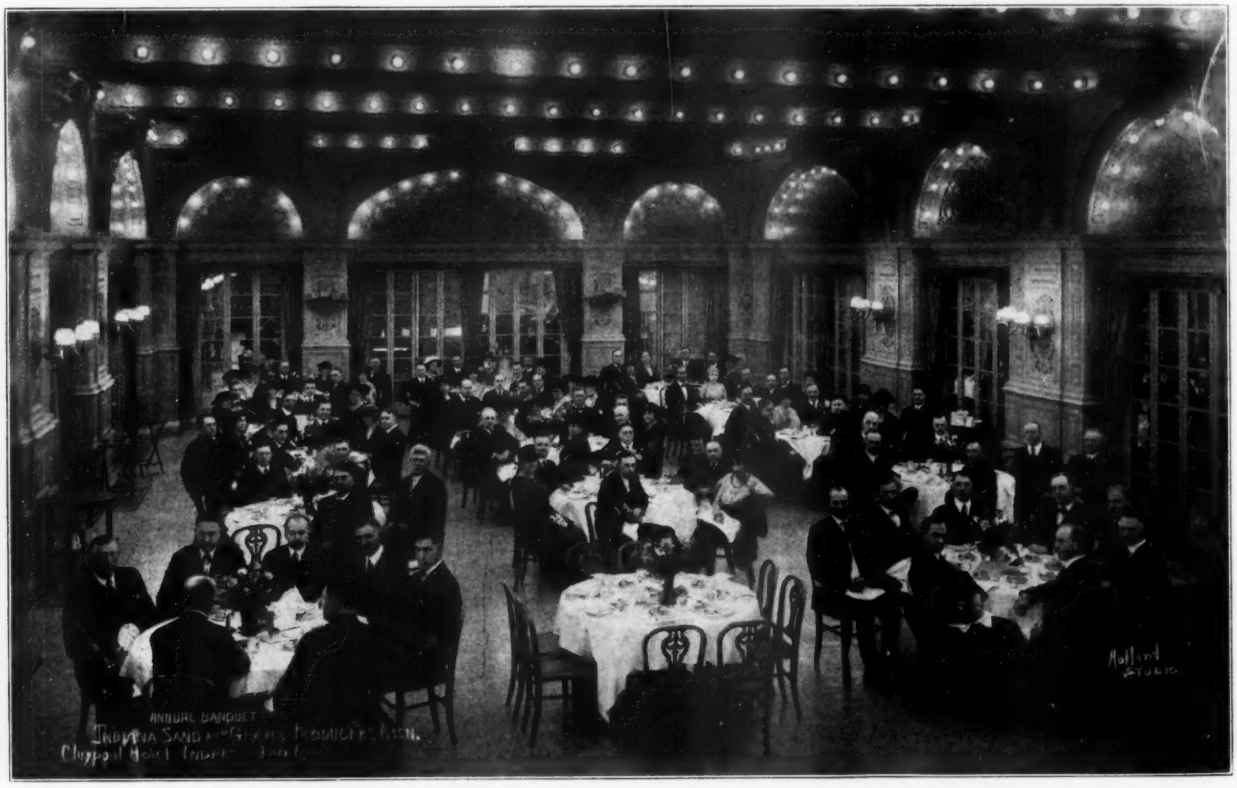
"It would be difficult to estimate the value of the Association if we should attempt to express it in the usual commercial terms. One member whose annual dues are considerably above the average has declared that so far as his firm is concerned, ten dollars have been gained where one has been spent. This is one thousand per cent on the investment and approaches the profits of the coal operators. Another member has repeatedly stated that he would rather pay the entire expense of the Association than to have its work discontinued. Others may not be so enthusiastic in their expressions of approval; but that the advantages derived have fully warranted the time and money thus far expended no one will deny.

Consistent Policy of Activity

"These benefits of which I speak have accrued in the past year as well as previously and will continue to be manifested as a result of following certain well-defined lines of activity which as the basis of further discussion I will set forth as follows:

"1. By the establishment of a friendly, helpful spirit between producers—the inevitable result of becoming better acquainted—which leads to the exchange of ideas with reference to operating costs and methods of production.

"2. By gaining, through practical field and laboratory tests and experiments, and through sources of information already available, a comprehensive knowledge of the characteristics of sand and



Seventh annual banquet of the Ind'ana Sand and Gravel Producers Association

gravel as aggregates for construction work.

"3. By co-operating with the state, county, municipal authorities and engineers; with architects and allied material producers in the development of reasonable and economical specifications and practices covering the use of sand and gravel.

"4. By extending the use of sand and gravel not only for purposes already developed but by opening up new fields.

"5. By handling the all-important question of car supply and at least in a general way the matter of freight rates.

Development of the Association's Plans

"In making further comment on these five phases of the Association work I will refer to them in the order enumerated:

"1. The success of any association representing men engaged in like pursuits depends primarily upon the degree of confidence that exists among its members, and more especially between those who come in direct competition. The Association has therefore attempted to foster and maintain a cordial relationship among the producers of the state. This has been accomplished for the most part through the meetings that have been held in each district. If the Indiana Association succeeds in doing nothing more than establishing and maintaining this spirit of mutual confidence among the producers it represents, its existence is fully justified.

"2. A great deal of experimentation with and testing of concrete has been done during the past twenty years, but this work has been carried on with no direct intention of developing the truth concerning the particular qualities and characteristics of sand and gravel as concrete aggregates, nor for directing their proper use for such purpose.

"The Indiana Association over two years ago laid plans for designing and conducting a series of tests of sand and gravel concrete, but the conditions brought about by the war made it impracticable to proceed. However, with prospects favorable for a normal resumption of business, the executive committee decided early last spring to carry out the former plans of the Association in that respect.

"Under the direction of R. C. Yeoman, who came into the service of the Association last March, a system of tests was designed which have recently been completed at Purdue University.

Must Know Most About Material

"It is highly important that we be fortified with correct and conclusive data for protecting the interests of sand and gravel producers. In this connection I wish to make it clear that it will not be the policy of the Association to depreciate the worth of competing materials, but we do expect to proclaim the favorable features of our own.

"3. Strange as it may seem, specifications covering the use of gravel for concrete purposes have been made to conform to specifications designed years ago for crushed stone. Little or no heed has been taken of the fact that there is a vast difference between the two aggregates as to percentage of voids, shape of particles, and other inherent characteristics. Then, too, specifications are frequently prescribed without giving consideration to the availability of materials that will meet the requirements as to size and gradation. It is apparent that here is a field in which our Association should be especially active, by working with engineers and architects in different parts of the state, in drawing specifications that are designed to take advantage of the economy of gravel concrete, while at the same time meeting the conditions as to local source of supply.

"4. The sand and gravel producers have had little to do with promoting the purposes for which their products are used. Too often the producer is confronted with a variable and frequently an unbalanced demand for his output. It is important, therefore, that the Association give attention to developing new markets, especially for sand and the smaller sizes of gravel.

Transportation Prospects

"5. (a) It is the general opinion among those who have given the matter consideration that there will be an unprecedented demand for sand and gravel, as well as other building materials, during the season of 1920, and for many years to come. But what about transportation facilities? In my opinion this is the most serious situation that confronts the business of the United States today, and to the sand and gravel producer with the outlook for an unusual demand for his materials, the matter is of vital importance. As you know, this question has been handled largely through the National Association during the last year. You are familiar with the odds against which we have worked, and which made it impossible in many instances to secure relief, but I am free to tell you that the situation would have been intolerable if we had not given the matter constant attention.

"All indications point to the fact that the car situation will not be any better this year. On account of the recent miners' strike there will be no stocks of coal on hand in the spring. Profiting by past experience, fuel for home consumption will be purchased and transported during the summer months. The demand for coal for manufacturing purposes promises to be extremely large, which means an increased demand for fuel used for transportation purposes. The railroads will be turned back to the owners on March 1, yet this fact will not increase the car supply for 1920 either actually or relatively.

"There is little doubt but that the distribution of cars will continue to be delegated to some sort of centralized control, which means that the best results will be attained by handling the question as an industry, as will our chief competitors for cars—the coal operators. If our business is to survive and prosper, we must be most active.

"(b) The Indiana Association from the time of its organization has held to the view that the question of freight rates should be left in the hands of the individual producer. Under general order No. 28 we suffered an average increase of over 50 per cent., while other commodities bore only 25 per cent. We now face the probability of another general advance. Under this menace of our business being seriously curtailed because high freights limit the selling territory and invite side-of-the-road competition, should the Association still believe that the question of freight rates be considered as purely a local matter and approached as such? In my opinion we can only combat this pending danger by presenting a united front.

Better Specifications

"A great part of the work of the Association for the past year, especially that having to do with testing and the development of specifications, has been preliminary in its character, but will serve as the foundation for more apparent results for 1920 and succeeding years. Our plans for this year contemplate the continuance of such tests as may be desirable in the development of specifications, and for meeting unjust criticism against and for extending the use of sand and gravel As a part of this work it will be our purpose to make a comprehensive survey of existing plants in order to gain full information as to capacities for various sizes of material, and for the sale of which we hope to be of assistance in developing permanent markets. In like manner we have planned to gain full information in regard to the construction work that is in prospect throughout the state, and by co-operating with the engineers will endeavor to harmonize the specifications for such work in so far as they relate to sand and gravel, giving due consideration to the character of the local supply for these materials.

"It is our further purpose to co-operate to a greater degree than has been possible in the past with other associations of the state in approaching matters of common concern, especially as they relate to the construction industry. In like manner it will be our desire to promote cordial and friendly relation-

ships with the sand and gravel producers of adjoining states, especially in those districts where there is overlapping of territories.

"Better Service"

"The slogan of the Indiana Association is 'Better Service.' I have been unable to find out who invented it or exactly what meaning it is expected to convey, but we cannot fail to recognize in these words two significant truths:

"(1) That the opportunity to serve is man's greatest privilege.

"(2) That there is always room for improvement.

"In applying this slogan to the individual producer, it betokens the desire on his part to turn out the best material possible—clean, well graded, and adapted to the purpose for which it is intended. It recognizes an obligation to keep his plant in order so that, barring conditions beyond his control, prompt and regular shipments may be made. It implies that he will give fair treatment at all times to his customers, his employees and his fellow producers, and with due regard to his own interests he will not forget the public welfare. In like manner it will be our desire to improve the service which it is our duty and privilege to render, and in so doing to employ only such methods as will gain respect and favorable recognition for the industry."

Concrete Aggregate Specifications

Prof. W. K. Hatt, of the civil engineering department of Purdue University, gave a talk on the results obtained in a series of tests with Indiana gravels as concrete road aggregates. Prof. Hatt stated that ideas of concrete aggregates were undergoing considerable revision and that the tendency was toward more liberal specifications, or rather the drafting of specifications suited to the most economical material available.

Regarding the division between sand and gravel, which is customarily the ¼-in. mesh screen, he said that this division was preferable to the ⅛-in. dividing line, because the finer the sand the more water required for a workable concrete; and it had been well established that the more water used in the mixture the weaker the resulting concrete. He said a mixture of aggregates with a modulus of fineness of 5½ made about the best concrete. The sum and substance of Prof. Hatt's talk was to the effect that the day is not far distant when sand and gravel plant operators can make use of a plant laboratory.

Freight Rates

The paper read by Ben Stone, secretary-manager of the Illinois Sand and Gravel Producers' Association, is printed elsewhere. Mr. Stone wanted it fully understood that he was in no way justifying a rate increase, but was merely attempting to handle the situation without gloves for both parties concerned.

It was estimated by Mr. Yeoman that the existing gravel plants of Indiana have a total capacity for 1920 of 3,360,000 tons, or twice the 1916 tonnage and over 50 per cent greater than the 1919 tonnage.

Group Membership in National Association

It was voted to increase the dues of the Indiana Association by 20 per cent and thus provide for the membership of the whole body in the National Association of Sand and Gravel Producers. The same proposition will subsequently be placed before other state associations.

Resolutions were adopted favoring the anti-strike provision of the Cummins bill for returning the railways to private ownership; and opposing any further increases in railway rates as confiscatory.

Election of Officers

H. C. Huffstetter, of the Brown-Huffstetter Sand Co., Indianapolis, was re-elected president, G. J. Nattkemper, of the Summit Sand and Gravel Co., Terre Haute, was elected vice-president and W. P. Carmichael, of the Carmichael Gravel Co., Williamsport, was re-elected treasurer.

Guests and speakers at luncheon and banquet included H. K. Bishop, chief engineer of the State Highway Commission, and A. H. Hinkle, chief maintenance engineer of the Commission.

Building Permits for 1919 Show Interesting Increase

STARTING from an almost dead stop and progressing on untried levels of prices, building during 1919 has developed a very favorable stage of activity which bids fair to be carried over into 1920.

Official reports to The American Contractor covering the year for 171 cities give a total estimated value of $1,326,936,702 for building permits issued. This is a gain of 198 per cent. over the total of $445,549,493 for the same cities during 1918.

In comparison with the corresponding month of the previous year, January, 1919 started with a loss of 12 per cent, but there was a steady growth until in November it was 717 per cent. In December there was a decrease to 488 per cent. However, the value of the December permits was considerably in excess of November.

December permits show an unusual activity, showing an appreciable margin over November, the slump month of the latter part of the year.

Throughout the year there have been no marked areas of special activity. Certain cities have done more building than others, and a comparison of activity among cities of about the same class is interesting.

Los Angeles makes a remarkable showing, a total of over 28 million; Washington, D. C., goes over the 20 million mark as against 7 million in 1918. Chicago has the largest total for the year—over 105 million. This is eclipsed, however, by the added totals for Greater New York, which run over 251 millions of dollars.

The best months of the year were August, September, October, November and December. August was the peak month, with a total valuation of permits mounting to $160,947,233,

Sand and Gravel Operator Becomes Plant Designer

THE GREENVILLE GRAVEL CO., of Greenville, Ohio, which operates eleven sand and gravel washing, screening and crushing plants in five states, having a total capacity of six million tons per year, and which further operates and maintains a department known as the Greenville Manufacturing Co., located at Greenville, Ohio, equipped with a modern factory and engineering department, announces that it has added a consulting engineering department to its organization.

This addition has been made by enlarging the already well organized engineering department so that the company is now in a position to offer the practical engineering experience acquired by seventeen years of successful operation and plant design of very wide scope, and extensive experimental work. The activities of this department will include engineering inspection of prospective plant sites, design and equipment of plants and supervision of erection.

Dutch Develop Low Grade Rock Phosphate

A LEADING DUTCH PAPER reports that phosphate deposits have been discovered in the eastern part of Holland, at a place called Ootmarsum, in the Twente District. About 30 tons of 15 to 20 per cent phosphate are being produced each day, and are being sold locally at prices corresponding to the prices of imported phosphate. The stratum varies from 7 in. to 3 ft. in thickness, but on account of the fact that it is not continuous the work of extracting the rock is very expensive. In some places the stratum is on the surface, in others it is as much as 25 ft. beneath the surface.

Practicability of Leitch System Proven

THE LEITCH INDUSTRIAL DEMOCRACY plan is being installed in plants in different parts of the country, and leading trade journals are devoting much space to explaining the system to their industries.

In this way the manufacturers and others who know from experience the value of industrial democracy figure that it will be possible to extend the plan on a fairly large scale even at the start and to expand its operation very widely by and by.

As an indication of how efficacious industrial democracy is in preventing strikes and other labor troubles, the employees of one plant where it is in use recently passed a resolution, at the time almost every factory in the locality was closed down through strikes, declaring that they had no grievances whatsoever and recording their deep appreciation of the absolutely fair and square working conditions existing in every department of their establishment.

Leitch shows why the present antagonism between capital and labor must be removed. He emphasizes the fact that the "human heart is just the same behind a worker's shirt or behind a boiled white front; that the day laborer has human joys and sorrows, ambitions and aspirations, just the same as the millionaire.

The Washington Post recently printed a dispatch from Danville, Va., headed "Give 5,000 Workers Share in Profits—Danville Cotton Mills Form Industrial Democracy." The dispatch read:

"Danville, Va.—Industrial Democracy went into effect today at the great cotton mill of the Dan River and Riverside Co., here where more than 5,000 men and women work. This new policy which gives every worker an interest in the conduct of the plant, means that where economies can be made and production increased, the saving will be divided equally between the stockholders and mill workers.

"A keen campaign preceded the organization of the house, Clifton J. Parrott, a loomfixer, being elected speaker. There are 117 members, one representative for every 40 workers in each different department, elected by the operatives. The senate is composed of 59 members, foremen and overseers, who assume office by virtue of their position. The cabinet of eight members is made up of the mill executives, H. R. Fitzgerald, presiding. The president of the senate is L. H. Rushworth, and the

By B. C. Forbes

vice-president is H. C. Morse, a cloth designer.

"Meetings will be held every week in two large halls on the top floor of the mill and the members will be paid while they are in deliberation. The senate will meet in the evening in order not to be hurried. After organization, both branches meet in session and the presiding cabinet officer appeared before a joint assembly and delivered a message. Legislation already proposed includes the resumption of the fortnightly pay roll and the building of a Y. M. C. A. for the Riverside division of mills.

"Dividends will be paid every 30 days and will be based upon the economies and increased production. The new method is expected to diminish the heavy labor turn-over in the local mills. The four governing factors of industrial democracy are justice, co-operation, economy and energy, to which 95 per cent of the mill workers have already subscribed. The new policy is based on John Leitch's theory put into practice in many large mills and factories with successful results."

Right Rev. Charles David Williams, Episcopal bishop of Michigan, preaching in Grace Church, New York, said:

"We have gone through all the stages of owner and slave, lord and serf, employer and employee. The next step is a co-partnership consisting of employer, employee and the public, the public coming in to regulate both and see that justice is done to all and that the ultimate consumer does not suffer.

"Democracy's fundamental creed is confidence in the innermost worth of the undermost man. We have got to have that belief if we are going to discharge our duty in the new day which is upon us. Christ had that vision. The whole gospel is based upon it, and if the Episcopal Church is going to be true to itself it will not falter now. In the democratization of labor and the League of Nations I see the greatest hope for the future, and it is the duty of the church to be allied with every cause which makes for humanity's betterment.

"If Bolshevism comes to the United States—and I don't believe it will—it will not be through the I. W. W. or any other of the organizations of that class, but because of the repressions of the reactionaries who are not wise enough to recognize present tendencies and adapt themselves to them."

The New Republic devoted more than two pages to a discussion of Leitch's Industrial Democracy, saying among other things:

"While the advantages of the plan are noted, the objection is raised that it does not go far enough, that it does not bring on the millenium industrially. If Leitch had attempted, at this stage of our economic progress, to bring forward a plan embodying all the idealistic theories advocated by scholars and sheer dreamers, he would have accomplished nothing more than the armchair theorizers, for his ideas would not have been accepted by a single industrial plant in the land. Has any of Leitch's scholarly critics accomplished one-tenth as much as he has accomplished in actually bringing employers and employed together on a friendly, profitable workable basis? Practical business men, who have to deal with merchandise and machines and materials and horny-handed workers, are rather tired of the outpourings of parlor geniuses who can theorize beautifully till the cows come home but who would have to have a guide to conduct them through a factory. Business men want, not mere theories, but actualities, things that will work in this workaday world. Leitch's industrial democracy plan works. It satisfies both workers and employers. It is too bad that it doesn't satisfy also the scholars who demand the millenium all at once."

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Price of Paving Advances 5 to 30 Per Cent in Chicago

THE PRICE OF STREET PAVEMENTS will be 5 to 30 per cent in excess of last year's prices during the ensuing year, in Chicago. The Board of Local Improvements opened bids January 10 on a number of paving projects.

Following is a comparison of the averages of the bids received compared with last year's prices:

Bituminated concrete (alley paving), $2.75 per sq. yd.; last year, $2.61.

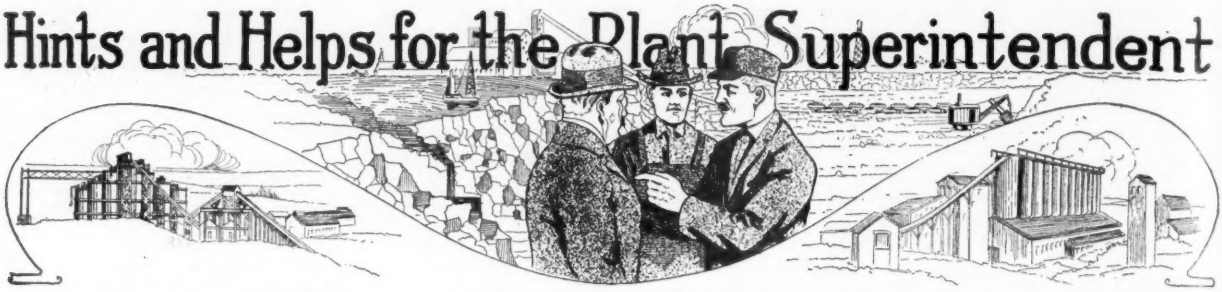
Brick (alley paving), $5.25 per sq. yd.; last year, $4.25.

Asphalt, type B (second grade street paving, for lighter traffic purposes), $3.30 per sq. yd.; last year, $2.56.

Standard asphalt paving (street, heavy traffic), $3.50 per sq. yd.; last year, $2.88.

Asphalt-macadam (street), $2.25 per sq. yd.; last year, $1.95.

Hints and Helps for the Plant Superintendent

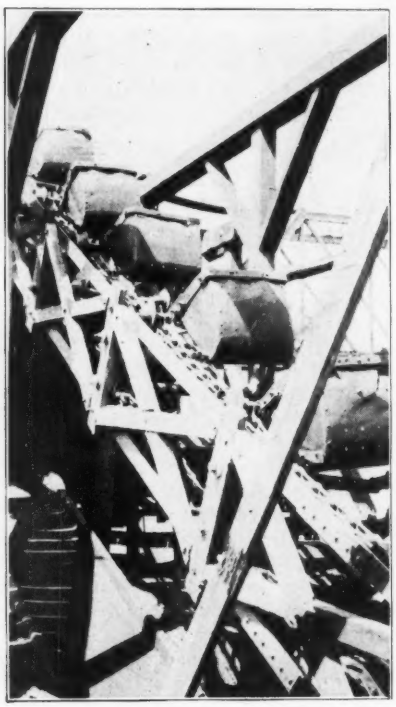


Osage River Gravel Dredge

THE VIEWS BELOW show a type of dredge that is not common on western streams—a ladder dredge. Sand and gravel producers at Buffalo, Pittsburgh, Baltimore and Philadelphia have had much success with dredges of this type, but of considerably heavier construction.

The dredge shown herewith is designed for digging only, and has no washing or screening apparatus as do the latest dredges of this type in the East. It is designed to dig in shallow water and to transfer the material to a barge or scow alongside.

Experience in Missouri seems to indicate that this method of sand and gravel excavation is inferior to dragline and pumping operations. This type of dredge has been found most useful in digging into compact deposits, but for this purpose the buckets illustrated are hardly strong enough.



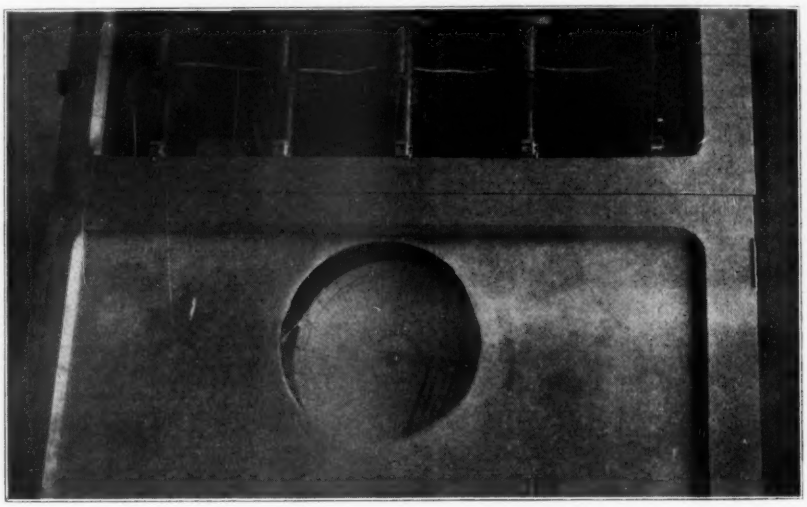
Perforated buckets of dredge

Automatic Record of Plant Operation

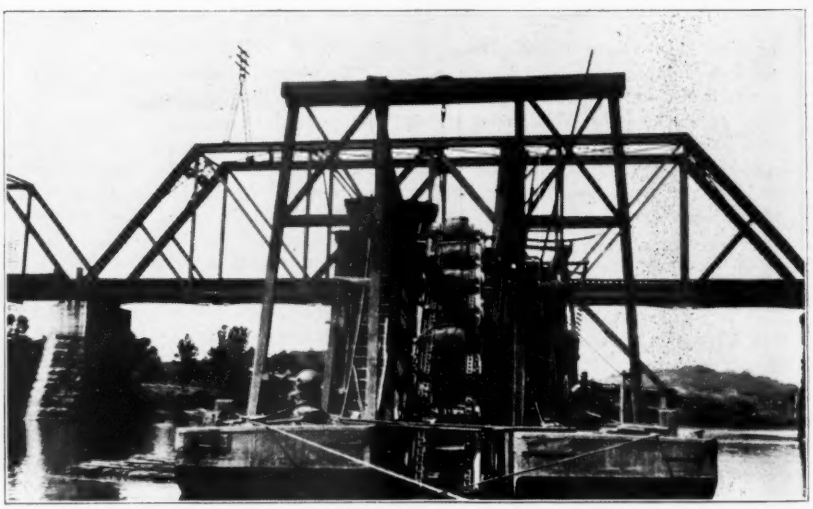
THE SECURITY CEMENT & LIME CO. maintains at its Security portland cement plant a conference room for foremen. In this room is the recording apparatus shown below. The row of counters above shows automatically by means of electric contacts the number of revolutions of the feed screws of the five kilns.

On the chart below is recorded the kiln performance, showing the time during which the kilns were revolving and any stoppages, giving both the time and the duration of the stoppage.

From these it is possible to calculate the approximate production of any kiln for the 24 hours of the day, or for any part of the day. These figures are posted on a blackboard in this room.



Automatic daily record of cement plant operation



Osage River sand and gravel dredge of the ladder type

Water Pan vs. Steam for Kiln Fires

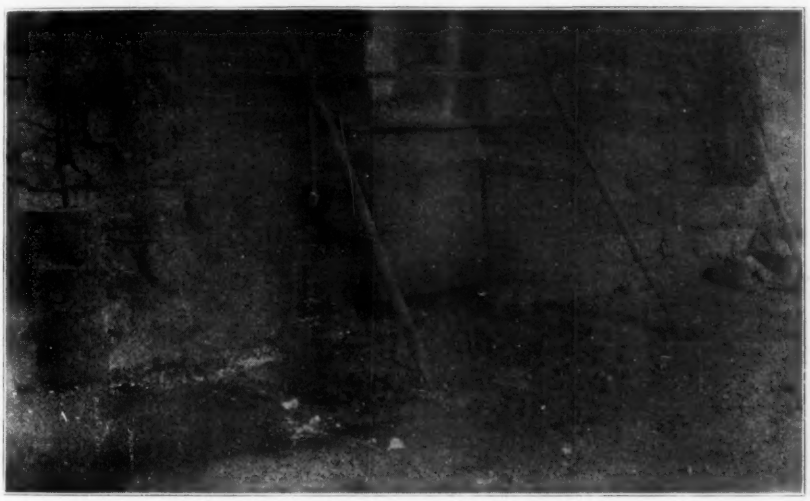
THE PRACTICE of introducing steam into the furnace of coal-fired lime kilns seems to have originated with the dolomite lime manufacturers of Ohio. There is a variety of theories as to the reason for the practice. The best explanation seems to be that it tempers the intensity of the flame and makes it "mellow."

The practice presumably originated in a desire to simulate as nearly as possible the furnace conditions when wood is used for fuel. Steam has been introduced both above and below the grate and bed of coals. Varying results have been attained, owing doubtless to the fact that there were so many other variable factors involved in each case that there was little chance for accurate comparison.

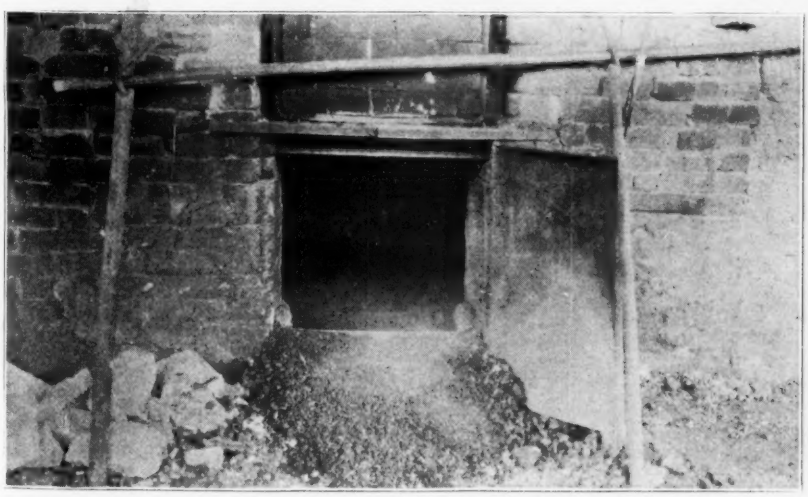
At least one Pennsylvania lime plant superintendent believes that the same results may be obtained by installing a water pan under the grate, as the accompanying view (lower) shows. The first view shows a kiln provided with a small steam pipe for releasing steam under the grate. Recently waterpans have been installed under some of the kilns and these have made it possible to compare the results with the steam-aided kilns.

The object of both devices here is claimed to be largely the saving in grate bars and increased ease of firing by the prevention of clinker formation. This particular plant superintendent got the idea from William E. Carson's Riverton Lime Company's kilns at Riverton, Va.

The other avowed object of creating a "mellow" flame could hardly be attained by the use of such small quantities of water vapor as go through the fire zone by this method.



Introducing steam under grate of lime kiln furnace



Water pan under grate, intended to accomplish same purpose

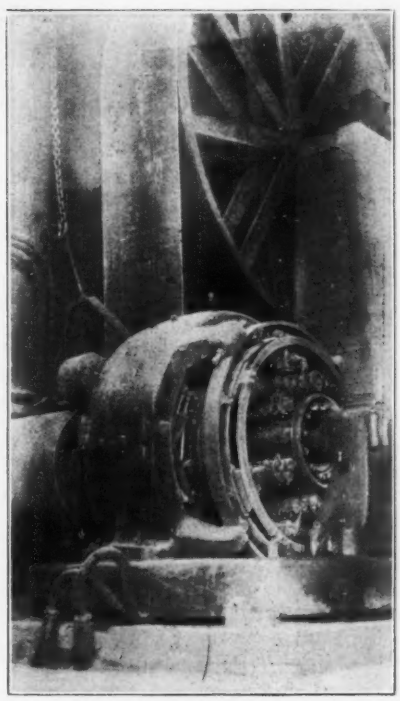
Motor Compartments for Cement-Mill Drives

IT IS BECOMING standard practice now to separate the motor drives of cement grinding machinery from the machines themselves by practically dust-tight partitions. This practice was referred to in the article describing the new plant of the Indiana Portland Cement Co., Greencastle, Ind., in ROCK PRODUCTS, January 3, as one of its distinctive features.

In rebuilding or improving a number of older plants the same practice has been adopted by addition of concrete walls between the tube mills and kominuters and their motor drives. The view below shows such an improvement at the plant of the Hawkeye Portland Cement Co., Des Moines, Ia. The tube mill and kominuter shafts extend through the partition wall and are driven by means of large pulleys by individual motors.

That the compartment is practically dustless is shown by the open-brush type of motor used.

Nearly all rock grinding and pulverizing plants experience trouble with motor drives from dust, and about the only positive cure seems to be the isolation of the motors in practically dust-proof rooms or compartments wherever it is possible or feasible to do so. Granite or silica dust is much worse on motors than limestone.



Electric drive in cement mill

Methods of Quarry Operation

Summary of the Practice and Experience of the France Stone Company in the Operation of Many Plants in Three Different States and Under Diverse Conditions

IN INTERVIEWING officers of the France Stone Co., of Toledo, Ohio, concerning modern methods of stone quarry operations and from observations at many of their plants, the following facts have been disclosed, which, it is thought, will be of interest to all crushed-stone producers. This company has been in the stone business for a long term of years and operates a number of plants in Ohio, Indiana and Michigan.

Stripping Operation

All stripping is done by steam shovels and material removed by locomotives and cars. In several instances the dirt has been disposed of for use in railroad construction work in the vicinity and at other times the material is used to fill up nearby ravines and for other miscellaneous purposes which often come up.

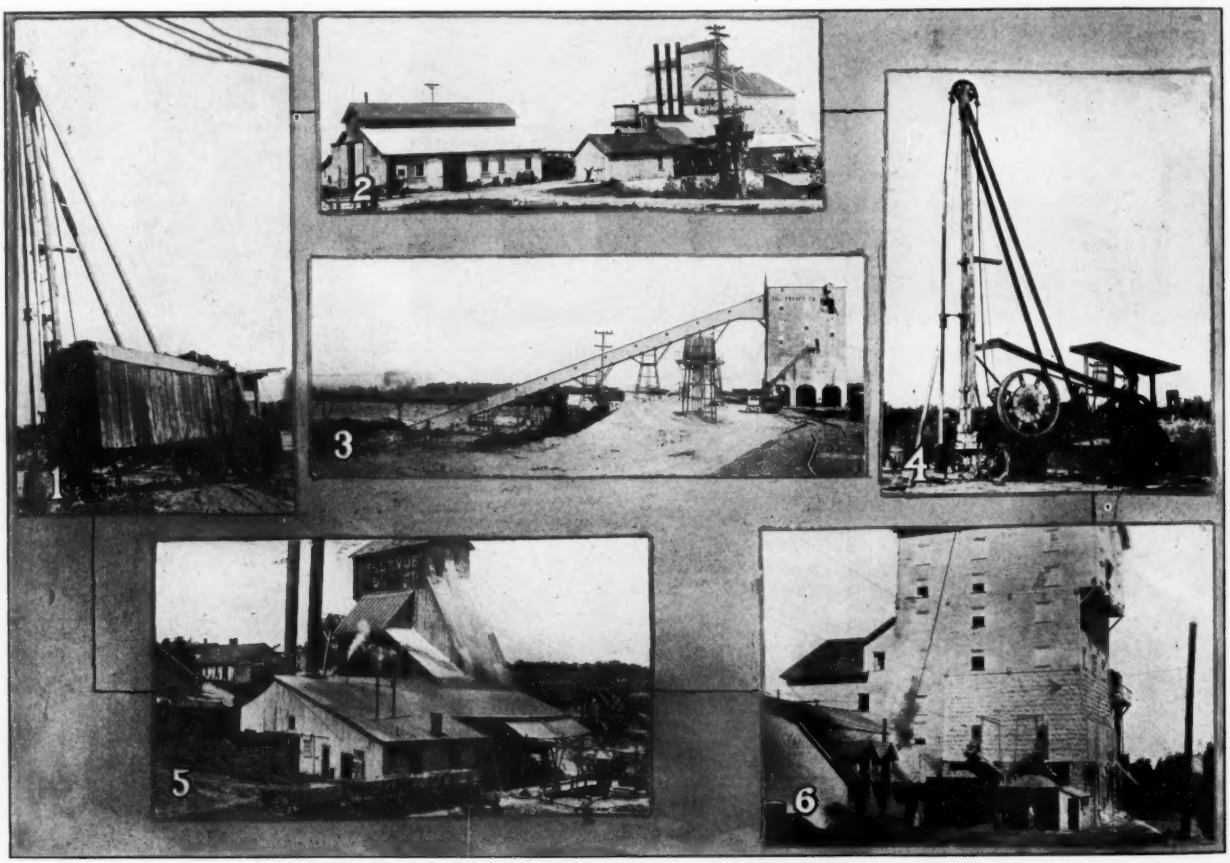
IN PUBLISHING this article Rock Products acknowledges the kind co-operation and assistance of H. E. Bair, general manager, and L. H. Hawblitz, assistant to the vice-president, of the France Stone Co.

The experience of the France Stone Co. having been not only of long duration, but covering various kinds of quarry operations, should prove of exceptional value. —Editor.

Drilling and Blasting

Owing to the many different types of rock, the method of drilling is considerably varied. In all cases, however, either electrical or steam-driven well drills are used. It is found that more satisfaction is obtained by drilling two rows of holes about 12 or 14 ft. distance from center to center. At one quarry where the face is some 60 ft. high it is necessary to drill the holes and then spring the bottom by small charges so that the increased charge of dynamite can be better concentrated at the bottom. Where the stratification of the rock is irregular, the charge is broken into two and, in some instances, three parts. In discharging, each part of the charge is supplied with two detonators. Where the stone shoots out too large for the crusher, it is plugged with small hand air-drills. This is the only use now made of the air drills.

Blasting at all plants of the company



(1) Electrical well drill at Monroe, Mich. (2) N. Baltimore plant and warehouse. (3) Middlepoint, Ohio, plant, showing belt conveyor. (4) Gasoline driven well drill. (5) Bellevue, Ohio, plant where agricultural limestone is made. (6) Holland, Ohio, plant where toughest and hardest stone is produced.

is under the supervision of a blasting engineer. Because of the increased cost of powder, it has been found advisable to systematically study the results obtained from the use of different types of powder. The blasting engineer visits the various plants and studies the stratifications and, as far as possible, determines the conditions and quantities of powder to be used.

Stemming, in general, is done with stone chips, except where there is trouble from water, in which case it is found that larger stones displace the water better.

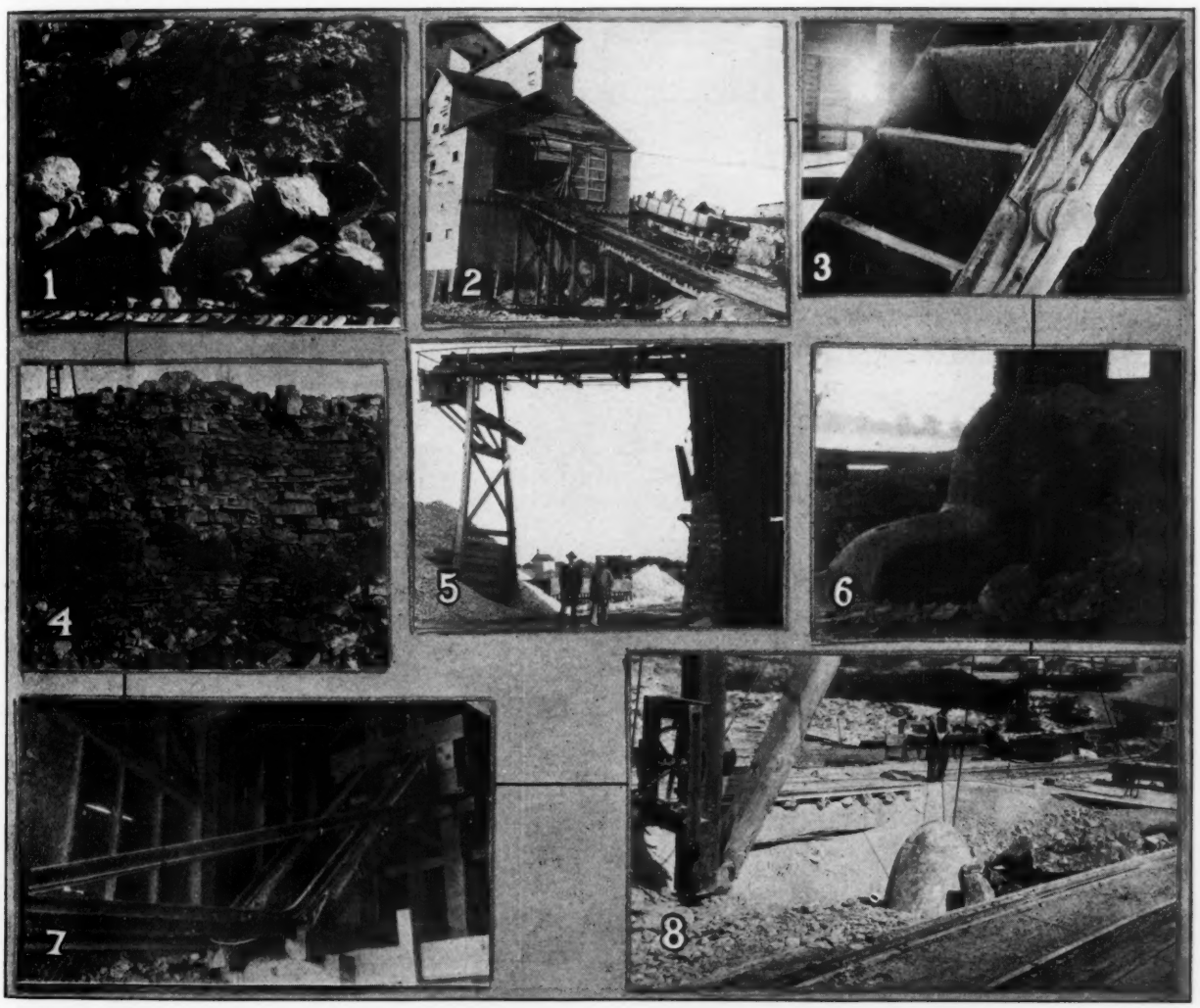
In prorating powder to a blast it is found that such items as stratification, toughness, hardness, and the opening of the initial crusher, are the deciding factors. For instance, although the thickest strata of rock are found at the Monroe, Mich., plant, one pound of powder will loosen 3½ tons of rock, whereas at the Waterville plant, where the strata are much thinner, one pound will loosen but 2½ tons. One explanation of this is that the Monroe plant has a No. 21 gyratory crusher for the main breaker and the Waterville plant has a No. 7 gyratory. Then, too, although the strata at Waterville are much the thinner, it proves to be the hardest, toughest stone quarried by the France Stone Co., and compares favorably with trap rock.

Shots are carefully computed and planned so that the blast will disrupt the stone, but not move it. The general practice in shooting is to use two detonators per charge and a 220-volt current. In second shooting, either plugger drilling or mud capping is used. It is found to be more economical to stop- and plugger drill large stones than to mud cap them.

At the time when the Waterville plant was visited some very interesting experiments were in process to determine which of two dynamites was the better for mud capping. It was found that for the tough, hard stone, about 30 per cent more of one powder was required to break up equally two rocks of the same thickness and size.

Method of Transportation

Two general types of cars are in use—the end dump and the side dump. At the larger quarries wooden side-dump cars, having a capacity of 5 yds. each, are used; however, before these cars are placed in service they are greatly strengthened through the use of steel strips and heavy bolts. In the smaller quarries both the wooden and steel cars are in service and seem to give about equal service. It is claimed, however, that steel cars will last longer but are harder to repair. The wooden cars may be easily overhauled and put back into service. Wherever possible, standard gauge equipment is installed.



(1) Big ones at Monroe, Mich. (2) Monroe, Mich., plant. (3) Sixty-inch, one-ton pan elevator at Monroe plant. (4) Holland stone, small, but hard. (5) On the job at Bellevue. (6) No. 21 crusher at Monroe. (7) Arrangement for end dump cars at Waterville. (8) No. 21 crusher mounted in the pit at Middlepoint.

Quarry Development

The France Stone Co. is a strong believer in the use of powerful quarry equipment. Large 90-ton and 91-ton steam shovels, with 3½ to 5-yard capacity dippers are in general use.

The quarries have been developed so that the trains and cars run about the face in loops. As many as three trains are used at the Monroe, Mich., plant, and two large steam shovels. At the Middlepoint plant, where the main breaker is situated in the pit, the trackage is so arranged as to have two complete circles in the pit. In this manner both ends of the quarry may be worked at one time and the crusher may be fed from both sides.

Belt Conveyor at Middlepoint

The France Company's first experience with a belt conveyor was at the Middlepoint plant. At all other plants the material is elevated to the main breaker by the usual incline, but in this instance the crusher is located in the pit and the locomotives pull up a slight grade to either side of the No. 21 gyratory crusher. The stone is elevated 140 ft. by a 38-in. rubber belt, 423 ft. center to center of pulleys. It is the company's experience that the belt will last about three years. This plant has a daily capacity of 60 cars.

Some of the difficulties have been that there is no regulation of flow of material onto the belt; that is, when the crusher is fully loaded it rushes the belt, and then when the crusher is idle the belt is under capacity. Also the stone falling from the crusher has a tendency to cut the belt. On the other hand, the belt conveyor eliminates the necessity of an incline and hoisting engine. The spillage is practically negligible and the only repairs necessary are to periodically cut out a piece of the belt, due to the stretch.

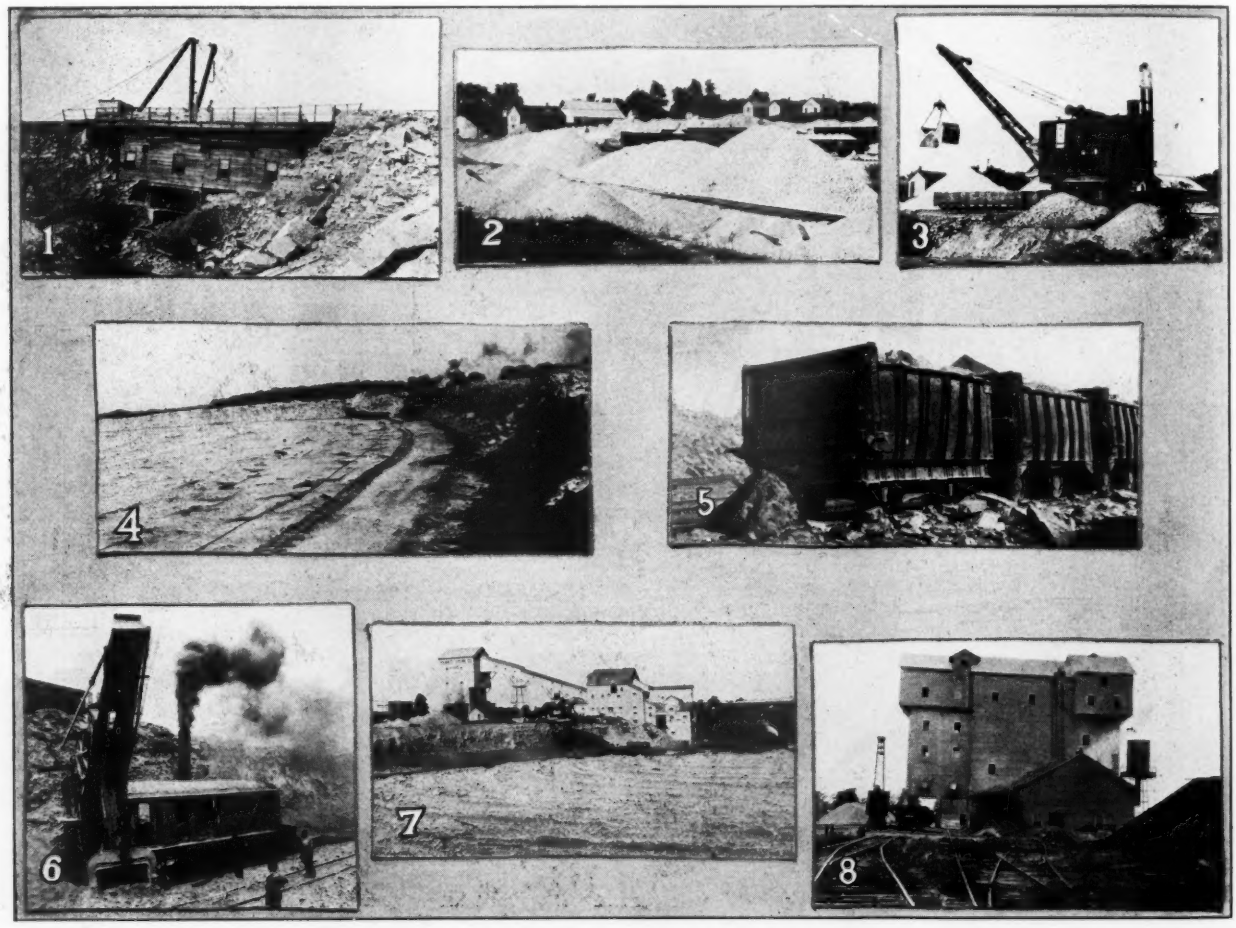
At the Monroe plant, a large all-steel bucket elevator, 5 ft. wide and 106 ft. center to center, is in use, each pan having a capacity of 1 ton. This type of elevator has practically an indefinite life because of the renewal of worn parts. In the smaller plants the buckets are mounted on a rubber belt and are therefore a combination belt steel-pan elevator.

Main Breakers

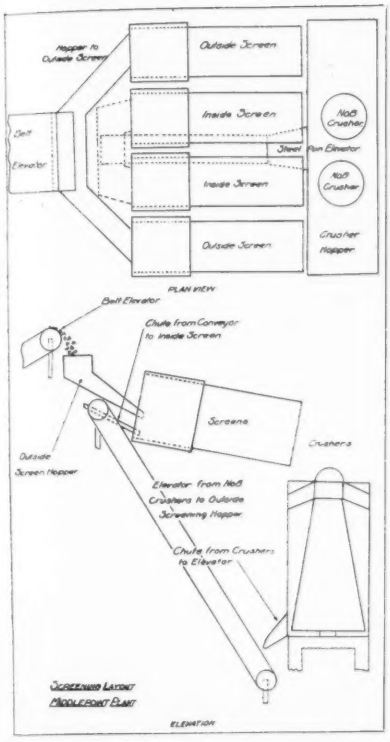
The main breakers used by the France Company are all of the gyratory type. The size of the crusher is dependent upon the stratification and hardness of stone. As has already been stated, the largest is a No. 21 and here the stone, which breaks up in blocks, is often 4 ft. in thickness. At plants where the stone breaks up in a small slab fracture, as at Bellevue, a crusher as small as a No. 7½ is used. In all instances but the Middlepoint plant, the main breaker is situated so that the material is delivered to it by means of an incline.

Types of Screens Used

Two types of screens are in use—cylindrical and shaker screens. The scalping screen is generally situated just above the main breaker and its over-size is rechuted to the secondaries. In so far as is possible, it is sought to group the secondary units so that they may be fed from the same hopper and driven from



(1) Pit crusher arrangement at Middlepoint. (2) Agricultural limestone storage at Bellevue. (3) Clam-shell used in storage work. (4) Level quarry floor at Bellevue. (5) End dump cars at Waterville. (6) No. 91 for quarry excavation. (7) Monroe, Mich., plant has 60 cars per day capacity. (8) Waterville plant.



Screen and crusher grouping at Middlepoint plant

a common shaft. Layouts are included of the screening arrangements found at the Middlepoint and Holland plants. These are different from the ordinary plan of layout and, it is claimed, give entire satisfaction.

Shaker screens are used for the smaller sized material, and where the agricultural limestone is made, as at Bellevue, double-decked screens are used and serve the purpose admirably.

Storage Facilities

Storage stock piles are provided where necessary and if the plants are close enough together one clamshell shovel is transferred back and forth for reclaiming the material. At Bellevue the agricultural limestone is stored in large quantities during the off-season so that orders may be filled promptly when the demand is heavy. Only a few plants are operated continually the year around. This makes possible the disposition of considerable stored material for the early spring market.

Repair Department

Although each plant has the usual equipment of machine shop and blacksmith shop, the repairs are generally handled by a separate organization. Owing to the large number of plants and the wide territory covered, a master mechanic is held responsible for the mechanical operation and maintenance of all the plants.

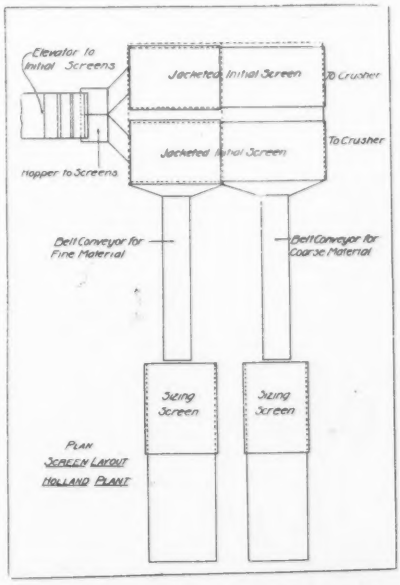
The headquarters of the repair department is at North Baltimore, Ohio. It includes a large and complete machine shop, foundry, boiler shop, car repair shop and spare part stock house and yard.

Besides being able to make all their own repairs, a complete line of spare parts are kept in stock to meet any ordinary emergency.

The boiler shop not only repairs boilers, but also overhauls and builds quarry cars.

The master mechanic and his men are called from plant to plant as needed. When not otherwise engaged, this crew is employed at North Baltimore, where there is always work to be done, overhauling parts which are constantly being sent in.

The machine shop and foundry, which works in direct conjunction with the repair department, is in reality a separate organization. Patterns of odd parts, not in stock, are made by an outside company and are cast in the foundry, and the machine shop finishes up the rough casting. Each sells its product at a price, which, though less than would ordinarily be charged by independent firms, is sufficient to defray overhead expenses. Since there is not enough repairs to keep these two shops going, they do considerable job work for other firms.



Large and small sizes separated at scalping screen and sized separately

Power

In so far as it is possible, the plants are operated by electricity. In the case of some of the plants at a considerable distance from power stations, this is impossible, and power plants are therefore installed. An electrical engineer has charge of the maintenance and repair of all electrical equipment.

Traffic and Shipping Departments

The shipping at all plants is under the supervision of the head of this department in the general office. Daily shipping reports are received from all quarries and shipments are made in accordance with the production of sizes during the day's operations.

The Traffic Department, under a traffic manager, concentrates its work on all traffic matters affecting shipments of material and service to customers. Cars are traced through large industrial centers, where a freight congestion might cause several days' delay in delivery.

Credit and Cost Departments

The Credit Department is under the supervision of an experienced credit man.

Data for cost accounting is obtained at the central office by various blank forms which are filled out and sent in by the plant offices.

Stone deposit at Middlepoint

Testing Aggregates in the Field

Simple Apparatus That Any Plant Operator Could Make Use of to Keep His Product Up to Snuff

By F. H. Jackson
Assistant Testing Engineer, U. S. Bureau of Public Roads, Washington, D. C.

A FACTOR which probably tends more than any other to discourage adequate control testing of highway materials is the time usually required to send samples to a laboratory for test purposes. Even under the most favorable conditions several days may elapse before a report can be secured, during which time the lot of material represented by the sample must be held.

Aggregates always are subject to variations in size, due to inefficiency in plant screening and other causes, and yet may be intended for use in construction requiring uniformly graded aggregates.

To test aggregates for such variations we have developed a field equipment, compact, light, and capable of withstanding a certain amount of rough usage. A description of such an outfit follows:

Description of Apparatus

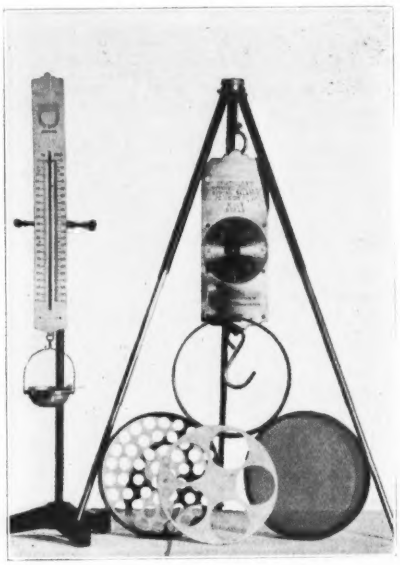
The field equipment so far developed consists of the folowing units:

1 set interchangeable stone screens, with screen plates having perforations 3, 2½, 2, 1½, 1, ¾, ½, and ¼ inch in diameter.
1 set interchangeable sand sieves, of 10, 20, 30, 40, 50, 80, 100, and 200 mesh.
1 circular spring scale having a capacity of 30 pounds and sensitive to 0.1 pound.
1 straight spring balance having a capacity of 30 pounds and sensitive to 0.1 pound.
1 straight spring balance having a capacity of 200 grams and sensitive to 1 gram.
1 demountable cubic foot box.
1 ordinary camera-folding tripod.
1 250 c. c. graduate.
1 strip of screen wire about 22 inches in length and 5 inches high.
2 canvas bags about 18x18 inches in size.

The interchangeable screen set consists of a number of perforated screen plates 8 in. in diameter, and two brass rings, one of which is provided with a narrow shoulder on the inside upon which a screen plate may be placed. The two rings are then firmly clamped together so that the screen plate is held rigidly between them. This forms a screen of the same size and shape as the ordinary laboratory type. When not in use all of the plates may be clamped together in the ring so that the whole set takes up no more room than a single laboratory screen.

The circular spring scale is equipped with a loose pointer for obtaining the net weight of the material being examined. It is graduated to 0.1-lb. divisions and one complete revolution of the pointer equals 10 lbs. The scale has a total capacity of 30 lbs. or 3 revolutions of the pointer.

The sand sieves are of the same general type as the screens, the various



Apparatus for testing aggregates

sieve plates fitting into the brass rings in the same manner. Thus, a sieve of any desired mesh may be made up by simply inserting the proper sieve plate in the lower ring and clamping it down by means of the upper ring. A soft rubber washer is placed over each sieve plate so that the upper ring will clamp down on it, thus making a dustproof joint. The straight spring balance is of a special type graduated on one side from 0 to 200 grams by 1 gram divisions and on the other side from 0 to 100 per cent by 1 per cent divisions. It is used in making mechanical analyses of fine aggregates. An aluminum cap is provided large enough to hold a 200-gram sand sample.

In the illustration of this equipment the circular screen scale is supported by the tripod in the way it would be in practice. A screen plate inserted in the lower ring is shown at **A**, a sieve plate inserted in the ring is shown at B, **C** shows a screen plate before insertion in the ring, and **D** the upper, or clamping ring. The 250 c. c. graduate is the only piece of glass in the outfit and is needed only when it is desired to make volumetric silt determinations. The circular loop of screen wire is used for making apparent specific gravity determinations of coarse aggregates. The object of the strip is to increase the capacity of a screen so that it may be used for weighing samples of sufficient size for this determination. It is rolled in the form of a loop and placed inside of the screen ring which in turn is suspended from the spring scales by means of three light wires.

A demountable cubic foot box is used for determining weight per cubic foot of crushed slag and other coarse aggregates. It is made of five pieces of light, strong wood ⅜-in. thick, the bottom 12¾x12¾ in., two sides 12x12¾ in., and two sides 12x12 in.

The importance of the proper sampling of materials in connection with the testing of aggregates can not be overemphasized. It is the one branch of testing work to which the least attention is paid, and yet, if sampling has not been done properly, the most carefully made tests are worse than valueless.

There are two points which must be borne in mind when sampling crushed stone and gravel aggregate. In the first place, the sample must be representative of the entire quantity being examined; and in the second place it must be large enough so that the largest individual piece will in no case weigh more than 2 per cent of the weight of the entire sample.

In sampling sand one of the principal precautions to be observed is to see that the sample taken contains an average amount of the loam or clay present in the shipment. Samples should be obtained whenever possible from damp sand, owing to the difficulty of obtaining a truly representative grading when the sand grains are dry. A composite sample weighing 10 pounds made up of samples from each end and from the top and bottom of the car should be taken.

Use of Apparatus

In making a mechanical analysis of a crushed stone aggregate with this ap-

paratus a number of points should be noted. The tripod should be set up and the circular spring scale suspended from it as close as possible to the material being examined. The shipment should then be sampled in accordance with the given suggestions. The whole sample thus prepared may then be passed through the various screens and the percentage by weight retained on each calculated; or, in the case of mixed aggregates graded up to 2 or 3 in. in size, a number of determinations may be made and the results averaged. It has been found convenient to make the original weight of each sample 10 lbs., or some multiple of 10 lbs. Inasmuch as the dial of the scale is graduated by one-tenth pound divisions, the various weights may then be read either as percentages direct or converted into percentages by simple calculation.

In making sieve analyses of sand or stone screenings less than ¼ in. in size the straight spring balance should be used. A 100 or 200 gram sample may be dried in any convenient manner and a mechanical analysis made in the ordinary way, using the interchangeable sieve plates. If a 200-gram sample is used the percentage of material retained on each sieve may be read direct from the scale. A mechanical analysis made in this manner on materials containing an appreciable amount of clay or loam, especially if it occurs as a coating on the sand grains, will not be absolutely comparable with a laboratory analysis. It will give, however, a fair indication of the grading of the material sufficient in most cases for control work.

Weight per Cubic Foot Determination

The determination of the weight per cubic foot is of value principally in the case of slag. The demountable box previously described affords a convenient way of making this determination on the job. The method so far used is to shake the material to refusal in layers of 3 in. each, striking the box upon the ground by rocking it back and forth 20 times after each layer has been deposited.

The systematic use of a field equipment similar to that described should prove of value both in the plant and field inspection of highway materials. A number of uses of the various units comprising the equipment will suggest themselves to engineers. For instance, the interchangeable sieves and small spring balance may be very conveniently used in sheet asphalt control work. In proportioning aggregates for various types of bituminous concrete roads, the outfit should prove of value. In fact, it may be used advantageously in any work in which a rapid determination of the size or weight of aggregate is desired.

Detailed information regarding the manufacture and use of any of the equipment described will be given upon application to the Bureau of Public Roads.

Plans Ripening for Louisville Crushed Stone Convention

Prospective Program Insures Live and Interesting Meeting of National Association

A. P. SANDLES, secretary of the National Crushed Stone Association, Columbus, Ohio, reports:

"We are having more luck than we expected. So far nobody has declined an invitation to attend our Louisville convention.

"Hon. Robert W. Wooley, Interstate Commerce Commissioner, Washington, D. C., just reports he would deliver an address at our convention. In accepting our invitation he says: 'I propose to make the freight rate and its bearing on the industry and cost of living the subject of my address.' He will speak for the Interstate Commerce Commission, which is expected to have even greater power over rate making in the future than it has had in the past.

"Hon. A. G. Gutheim, of the Car Service Section, U. S. Railroad Administration, in accepting our invitation, says: 'I take it from your letter that no set talk would be expected, but I could merely profit with your members in discussing transportation subjects generally.' Mr. Gutheim is the man who has shown a willingness to help us in our grief whenever and wherever he could. He will continue to be in the engine room and power house of transportation affairs. Meet him at Louisville. Let him know we appreciate his good will and helping hand.

Electric Power Expert

"The National Electric Light Association has asked a place on our program to present to our association the subject of electrifying all power machinery in the crushed stone industry. We believe this subject, illustrated and demonstrated, will be of great interest.

Many Guests

"Many of our members are urging their state highway commissioners and railroad superintendents to attend our convention and be their guests at our big banquet Tuesday evening, Feb. 10.

"The change of date of our meeting to Feb. 9-10-11, seems to have met with universal approval. Col. R. B. Tyler is on the job at Louisville. He has had a flood of requests for hotel reservations. These requests come from every section of the United States. Remember other conventions will be held the same week in Louisville. Do not delay making your hotel requests of R. B. Tyler, of the R. B. Tyler Co., Louisville, Ky.

"The first session will be held Monday afternoon, Feb. 9, 2 p. m. Most quarrymen so far reporting say they expect to arrive in Louisville Sunday evening.

"Colonel Tyler's entertainment headquarters will be rooms 3 and 4 on the tenth floor of Hotel Seelbach. Our convention room will also be on the tenth floor."

Southern Quarry Industry Is Threatened With Federal Competition

SIR: There is a bill before Congress—H. R. 10329 and Senate 3390, which vitally affects the stone industry in the South. It provides funds to open and operate a quarry and gives the operating company, all the stock of which is owned by the United States government, the right to sell this material in the open market.

The main object of this quarry is to provide stone for the manufacture of ammonium nitrate, and we think the sales should be confined to nitrate products, as the chief competitor for these products is the nitrate from Chili; but we do not believe that it is just for the United States government to go into competition with its taxpayers.

We do not wish to oppose this bill in its entirety, as we believe the nitrate at Sheffield, Ala., will be a wonderful help to the farmers in the South, but we do think the stone industry should register strong objection to the government going into the crusher business, and believe if the matter is brought to the attention of the administration that it will be easy to have the bills amended to cover our objection.

The matter has been called to the attention of the National Crushed Stone Association, and of our local association, and we believe it is a matter your editorial department will be interested in investigating and commenting on.

FOSTER & CREIGHTON CO.,
By W. F. CREIGHTON.
Nashville, Tenn., Jan. 6. 1920.

Burnt Lime vs. Ground Limestone

Agricultural Demand Calls for Co-operation and Not Antagonism

By Elmer O. Fippin

Chief of the Agricultural Department, National Lime Association, Washington, D. C.

IT IS CONCEDED on every hand that liming materials have a large and permanent place in the maintenance and upbuilding of the productiveness of soil. Wisdom dictates that lime be combined with the use of organic matter, rotation of crops, proper tillage, drainage and the use of suitable fertilizers in such a way that they may adequately supplement each other and also the natural capacities of the soil to be improved.

A Big Field for Development

Estimates are made from time to time of the tremendous amount of liming material needed by the cultivated land of the country. These estimates run into many millions of tons and amount to many times the present total use of liming materials for all purposes. At least two-thirds of the acreage of any state may be regarded as having a need for lime. In other words, here in agriculture is a potential market for more material than both burnt lime and limestone producers can turn out in years to come.

Not Competition but Co-operation

The business is not so much one for competition between limestone and burnt lime as for effective education of the farmer to the need for and the profit to be derived from the use of lime and the supply of suitable material at the maximum of convenience to the farmer. The key word in all sound business is service to the consumer, and the larger profit he can be shown, the more assuredly will he use and increase his use of a particular product. The agricultural lime business is no exception to this rule. In the matter of lime his attention must be directed not to one year's results but to the results that continue to accumulate over a period of years.

There would seem to be opportunity for "all hands" to co-operate in this educational process and in working out the details of handling the material *to the farm*. Fair and unbiased statements in educational and promotional work would seem to be the first plank in the platform of such a program. Unwarranted claims for any material and unwarranted criticisms against any suitable material are equally undesirable and in the end are sure to react on those advancing them.

Some Facts

On this basis the writer desires to discuss some of the contentions that have been made against the use of burnt forms of lime on the soil. This material—by which is meant lump, ground, quick and hydrated lime—has long been used on the land. The relative merits of burnt and carbonate forms of lime have been under discussion more or less since the early part of the last century.

Elmer O. Fippin

Burnt Lime and Organic Matter

First of all let us examine the contention that burnt lime destroys the humus of the soil. Manifestly if burnt lime is shown to have particularly deleterious effects not possessed by carbonate forms of lime, it does not have an equal claim with the latter to use by the farmer. If, on the other hand, those statements of deleterious effects are shown by both careful research and by a consideration of practical facts to be false, then all such criticisms have only the weight due to false claims.

The common statement has been that burnt lime is specially destructive of humus and that—to quote a recent statement in a contributed article in ROCK PRODUCTS, "It attacks the organic matter as it attacks one's flesh and destroys it by eating away its substance through chemical action."* The clear implication of most of the statements of this character is that both lump and hydrated lime are capable of destroying organic substance chemically by oxidizing the carbon, as this is the only way the organic substance can be really destroyed. It is presumed to be an action like fire. No actual investigations are ever cited by the proponents of the above criticism.

Dr. McIntire's Notable Investigation

One and only one comprehensive investigation of this particular subject has been made. It is a part of a general study of the changes and effects of burnt as well as carbonate forms of lime in the soil. These investigations are being conducted by Dr. W. H. McIntire, research chemist, with reference to lime, at the Tennessee Agricultural Experiment Station at Knoxville. The particular report presenting carefully collected data on the possibility of the chemical destruction of organic matter by burnt lime, appears in the May, 1919, number of the Journal of Soil Science, published by Rutgers College at New Brunswick, and has just come from the press. The subject of the paper is the "Carbonation of Burnt Lime in the Soil." This particular investigation was carried on for the degree of Doctor of Philosophy at Cornell University.

From all his studies, including strong solutions of both lump and hydrated lime in contact with humus and other organic material and with soils both under laboratory and field conditions he finds *absolutely no evidence of a chemically destructive action of caustic lime on organic matter.*

Moreover, it is to be noted that such an action is not recognized within the range of processes of organic chemistry. Finally it should be remembered that strong solutions of caustic (burnt) lime are used in clarifying sugar, in tanning leather and in making paper by certain processes, without any chemically destructive action on the plant or animal substance being recognized. Lime water is a solvent of certain substances, but they are no more destroyed than when sugar is dissolved in water.

The Pennsylvania Data

A popular practice is to present a statement appearing in an old report of the Pennsylvania Agricultural Experiment Station indicating that where burnt lime has been used on certain plots as compared with limestone, there has been much the largest destruction of organic

* "Future of Agricultural Lime," by James L. Burgess, North Carolina Department of Agriculture, Rock Products, Nov. 22, p. 18.

matter, Dr. Frear, who made the first statement, has completely reversed and corrected that statement in his recent bulletin Number 261, entitled "Sour Soils and Liming." The error in the first instance resulted from comparing plots that any reasonable person now agrees should not be compared. If any conclusion is to be drawn from these Pennsylvania plots with reference to the disappearance of organic matter, it is that less disappeared from the plots receiving the burnt lime than from the plot receiving the limestone.

Caustic Lime Changes to Carbonate

The second point to be kept in mind is that caustic lime in the soil changes in a few hours or a few days at the outside, into the carbonate and other combined forms. In other words it either unites with the carbon dioxide of the soil atmosphere and the soil water and takes on the same chemical form as limestone, or it unites with the silicates and other materials in the soil to form new chemical compounds in which the lime bases perform their function and seem to be effective to meet the general needs for lime in the soil. Therefore, even if a chemically destructive action of caustic lime had been shown, it would have no importance beyond the few days before the change to the combined form, and for all the months and years after that change it would be active in the same manner as limestone, shells or marl. Hence the criticism loses force on both counts unless carbonate forms of lime in the soil shall also be regarded as injurious.

The objection to burnt lime evidently rests on an imperfect mental analysis of the changes and processes involved. Let us now recognize clearly that liming materials applied to the soil do result in a more rapid destruction of organic matter in the soil. If this is not a chemical process, how does it occur?

Natural Decay in Soil Organisms

It is widely recognized that lime carbonate promotes the growth and activities of most of the small organisms in the soil. just as it promotes the growth of higher plants where there is a shortage of suitable alkaline materials. Those organisms feed upon the organic substance just as the higher animals feed on plant and animal substances and in the process of nourishment and associated changes, the organic substance is destroyed. By breaking down the fresh plant and animal substance in the soil with the formation of humus and other soluble materials, its constituents are made available to crops that may be growing in the soil and the soil is rendered more fertile. This is the purpose of using lime materials. It is equally as true for limestone and marl and oyster shells, in so far as they are soluble, as it is for burnt forms of lime, because in the main they act in the same way, namely, as carbonate.

In the language of the old saying, "One can not both have his cake and eat it." It is part of the business of farming to maintain humus in the soil by means of crop residues, stock manure and green manures. Commercial fertilizer such as acid phosphate, muriate of potash and nitrate of soda, also increase the rate of decay of organic matter in the soil, but in no proper way can they be said to burn the humus. As a matter of fact, both fertilizers and lime may put into the soil, in the form of larger crop residues, more plant material than is lost by this more active decay.

It has been claimed that burnt lime sterilizes the soil; that is, kills the small organisms. A strong solution of almost any chemical substance will kill these organisms. Limestone kills certain soil organisms, especially those that dislike a sweet or alkaline medium. All investigations show a change in bacterial activity following an application of lime and in the case of burnt lime any such reduction in bacterial numbers is always followed by a tremendous increase in their activity. On the whole, the more marked effect of burnt lime due to finer division and great availability is to be regarded as desirable and not objectionable.

Lime and the Waste of Soil Constituents

Other claims that have been made are that burnt lime wastes ammonia and increases the loss of mineral plant nutrients. First of all, it will be evident on reflection that if burnt lime quickly changes to the carbonate form, such displacement can no more occur with burnt lime than from the use of limestone, beyond the first few days after application. Second, while it is recognized that caustic lime can displace ammonia it is also known that one volume of water absorbs 100 volumes of ammonia and since this process occurs in a moist soil it is unlikely that any appreciable loss of ammonia occurs.

Moreover—and this is the "proof of the pudding"—Dr. McIntire, in the study mentioned above, extracted the atmosphere from a field soil in which caustic lime was known to occur and found no trace of ammonia.

Contrary to ordinary belief, the effect of lime on the soil is more in the direction of conserving mineral elements than to increase their loss. Lime does not unlock potash. It does not increase the loss of phosphorus, which is usually very thoroughly conserved in soils. It may increase the loss of sulphur.

Moreover, burnt forms of lime are not more lost from the soil than carbonate forms. Their more free entry than limestone, into silicate forms of combination operates to conserve lime in the soil.

Physical Effects

When it comes to the improvement of the tilth of the soil the burnt forms of lime are shown to be much the most effective. It is questionable whether in any direct way limestone improves tilth, and there is some indication of the reverse effect if it is not coupled with a large supply of humus in the soil.

Field Experiments with Crops

Turning to field experiments with crops where both burnt lime and limestone have been used, the data at the Ohio experiment station covers the last period (14 years) in the lime phosphate test, and is most dependable. In these data no proof is found that limestone is superior to burnt lime when used in chemically equivalent amounts. In a summary of all crops for the entire period, and all rates of application, the burnt lime has produced per three year rotation an average increase in grain and hay (straw omitted) amounting to 2703 lbs., while limestone has produced 2308 lbs. worth; at 2 cents per lb., $54.07 and $46.16, respectively.

Practical Convenience

Consideration of the use of liming materials on the soil should keep in mind first, the cost delivered on the land and not at the freight station. The labor saving in hauling the more concentrated burnt lime is a consideration the farmer will know best how to appreciate. Figured on this basis, the cost of a pound of available oxide of lime is very close to the same amount in the different forms of lime when delivered at the farm. Naturally the burnt forms, being more concentrated, have largest advantage on long hauls.

Fairness to the Farmer

Having in mind that there is a place for both limestone and burnt lime, it would seem to be the part of wisdom to recognize the full merit of each material, and for the limestone to be used more especially where the shorter haul is involved and the burnt lime on the larger haul territory. To exclude the farmer from the use of either material by unwarranted claims or false statements is to work against the real interests of the farmer and in the end against the industry making the false claim.

Small Applications

Finally, we believe the interests of the farmer are better served by frequent small applications, related of course to the needs of the soil, than by large applications once in one, two or three rotations. The average farmer finds much practical difficulty in covering his farm with a ton or more of material per acre every five years. We are inclined to believe that there is a larger place than is now recognized, for the regular application of 1,000 lbs. of lime on the tilled and grain crops much as fertilizers are used. This idea opens up an entirely new field that must be reserved for some future discussion. The agricultural lime business is a big sound growing business, worthy of the united push of all parties concerned.

Florida Gypsum Deposit Explored*

Only Known Source of Gypsum in the States South of Virginia

By R. W. Stone
U. S. Geological Survey
Washington, D. C.

THE ONLY DEPOSIT of gypsum in the United States south of Virginia and east of the Mississippi River is in Florida. Gypsum occurs abundantly in the United States, particularly in the Rocky Mountain region. The earliest discovery of gypsum was in New York, which is today the largest producer, and which has a supply sufficient to last, at the present rate of production, for many years. Ohio and Michigan are large producers of gypsum, and Virginia has a small deposit which has been mined for many years. Iowa is the second

Florida deposit of gypsite

largest producer of gypsum in the country, and the Western States, although having beds of gypsum ranging in thickness up to 60 ft. and extending for hundreds of miles, are as yet, by reason of the comparatively meager population and high freight rates, only small producers. The southeastern part of the country, however, has only one deposit, and that undeveloped. There is a very considerable population between North Carolina and Mississippi which up to the present is supplied with gypsum products shipped several hundred miles.

Gypsum is used for making plaster of [illegible], hard wall plaster, plaster board, and hollow tile and blocks and for agricultural fertilizer. In view of the fact that gypsum plaster block can not support great weight they are used almost exclusively for interior partitions where the weight of the building is borne by steel frames, but in two or three localities in the United States buildings are constructed with gypsum block as the main walls. In the arid climate of Arizona and Big Horn Basin, Wyoming, houses, garages, and other one-story structures built of gypsum blocks have been in use for a number of years and the walls are as sound today as when erected. The writer does not know of gypsum houses in other parts of the United States, but sees no reason why they should not be equally durable in those parts of the country which are not subjected to severe frosts. It seems to the writer that there is a field in Florida for this material in the construction of bungalows and other types of low buildings. If gypsum should be demanded in large quantity for structural material, or as a source of sulphur fertilizer in the South Atlantic States, the utilization of the Florida gypsum deposit would receive consideration.

Deposit Long Known

The gypsum deposit in Florida has been known for many years and was first described by Dr. David T. Day of the United States Geological Survey in 1904. In the past twenty years others have investigated this deposit, but its development has not been undertaken because of its manner of occurrence, and because the market seemed to be well cared for by gypsum from Virginia and Northern States.

The writer recently had an opportunity of examining the Florida deposit, and the following description is based on observations made at that time.

Gypsum occurs in Panasoffkee Swamp, about six miles west of Panasoffkee in Sumter County near the middle of Peninsular Florida. Panasoffkee consists of a store, railway station, three or four houses, and a shingle mill. As there are no accommodations in that place, visitors may stop at Bushnell, the county seat, a few miles to the south, and go to Panasoffkee by automobile.

The exact location of the gypsum deposit is known to only two or three men and it is necessary to secure the service of S. Stephens or A. J. Burnham of Bushnell, as guide. The trip from Panasoffkee into the swamp is made by motor boat. Mose Marsh of Panasoffkee, storekeeper and good fellow, owns a small launch and may be counted on as a means of reaching the destination. With his gun and fishing tackle there is sure to be something for dinner. It is advisable to start early in the day because it takes about three hours to make the trip across Panasoffkee Lake, up

Illustrating necessity of difficult stripping operations

*Published with permission of the Director, U. S. Geological Survey.

Withlacoochee River and Jumpers Lake, to the mouth of Bear Island Creek. One may see many ducks and other water-fowl, hear the roar of a bull alligator, and catch sight of large turtles and fish while the motor boat glides through the narrow channels of the swamp water-ways. As Bear Island Creek is choked with water hyacinth and other vegetation it is necessary to take along a pole-boat for going up this small stream to the islands on which the gypsum occurs. Also, the visitor should be provided with clothes suitable for wading, as much of the foot work is through water, and one may, if careless of his footsteps, get wet all over.

Not a Continuous Deposit

The gypsum occurs on three small tracts of hummocky land known as Bear Soapstone and Burnt Islands. These islands are about four miles west of the Seaboard Airline Railway at a point 3½ miles south of Panasoffkee. Pine land extends within about three-quarters of a mile of the islands, but as the remaining distance is swamp grown up with saw grass more than head high, access from the land in this direction is so difficult as to be impracticable and the much longer route by boat is the only feasible one of reaching the islands. These islands are covered with a forest of palmetto, cabbage palm, cypress, live oak and other trees with almost no underbrush. There are a few cattle tracks winding over the islands, but they lead nowhere in particular, and the open spaces in the timber look so much alike that the services of the guide, therefore, are highly essential.

The surface of Bear Island is dotted with many hummocks from 3 to 6 ft. high overgrown with vegetation. On digging into these hummocks gypsum is discovered practically at the surface. It is not rock gypsum, the material commonly used throughout the United States for making plaster, but a soft, incoherent earthy mass of fine gypsum crystals or particles having the character of gypsite, and like the material used by gypsum plants at Douglas, Ariz., and in a few other localities.

Because of inclement weather, the writer unfortunately did not reach the islands until late in the afternoon and so could not make a thorough investigation of the occurrence, but was told by Mr. Stevens, who has explored these islands, that the hummocks of gypsite on Bear Island extend in a northeast direction for nearly a mile in a belt one-quarter of a mile wide. Accordingly, the area of gypsum on Bear Island would be approximately 160 acres, but as the hummocks are detached, with little or no gypsite between them, the available quantity on Bear Island probably is not more than 200,000 tons.

The occurrence of gypsum in detached mounds, like dipped candy on a confectioner's tray, is not an attractive mining proposition.

Bear Island and Soapstone Island are separated only by a narrow belt where there are no hummocks, and there is more water than on the so-called islands.

On Soapstone Island, which is a half-mile long, gypsum forms low hummocks over many acres, but at the south end of the island there is an area of several acres in which there is a comparatively level-topped deposit rising about 10 ft. above water-level. Bordering this larger deposit there are many hummocks rising to 10 ft. in height, but those on the northern part of the island are much lower. The deposit at the south end of Soapstone Island is the largest compact body that has been discovered. Drill holes sunk in it are reported to show an average thickness of 8 ft. of gypsite. The overburden consists of two or three inches of vegetable mold.

The bottom of the gypsite deposit seems to be practically at the level of the surrounding swamp. The writer noticed that overturned trees show a flat mass of roots but no tap-roots. It might, therefore, not be difficult to strip off the forest and leave a clean surface of gypsite.

A conservative estimate of 150,000 tons available on this island may seem to one not familiar with the gypsum industry to be a large quantity, but a plant having such a small capacity of 10,000 tons a year would exhaust it in 15 years. Detailed examination might show as much as 350,000 tons of gypsite on this island, including some of the hummocks adjacent to the main deposit. Burnt Island, which lies about 200 yards east of Soapstone Island, also is reported to have a similar deposit of gypsite occurring in hummocks.

Feasibility of Working Deposit

In view of the location of the gypsite in a swamp, probably the most feasible method of quarrying it would be by steam shovel or floating dredge, which could deliver the material to tram cars running on a track built on piles across the mile of water to the pine land on the east. The very wet condition of the gypsite would make desirable the location of a drying and calcining plant as near to the deposit as possible in order to save haulage.

Samples of the gypsite were obtained by cleaning off a few inches from the face of an exposure on Bear Island to get unstained material free from vegetation, and on Soapstone Island, by digging from the side of a hole in the deposit. The analyses made in the chemical laboratory of the U. S. Geological Survey are practically identical with that of the sample obtained by Dr. Day, and are given below:

	Bear Island	Soapstone Island
Calcium oxide (CaO)	32.39	32.30
Sulphur trioxide (SO_3)	44.10	45.00
Water, loss on ignition, etc.	21.64	21.53
Ferrous oxide (Fe_2O_3)	.52	.32
Silica (SiO_2)	.55	.26

These analyses show the composition common to gypsum or gypsite and suggest that there is no reason why the material should not be used for making wall plaster and other gypsum products.

The meager evidence obtained in the very short time spent on the islands suggests that the gypsite has been derived from springs. It would seem that at some earlier geologic period the land stood at a slightly higher elevation and the gypsiferous waters rising under artesian head reached the surface here, and evaporating, made mounds of gypsite.

Department of Agriculture Urges Early Ordering of Lime

UNDER THE HEADING "Order Lime in Advance," the "Food and Farming Weekly," No. 86, of the U. S. Department of Agriculture, prints the following:

"Farmers probably will not be able to secure lime to meet their agricultural needs if they wait about ordering it until they are ready to apply it. Under old conditions, companies supplying agricultural lime recognized spring and late summer as the two periods of demand, and farmers have ordinarily ordered their lime at the time they wished to apply it, in order to save time and work by including hauling from the railroad station and applying to the land in one operation. Under present conditions, lime manufacturers are no longer able to adjust their business to this practice. Owing to shortage of labor in their own plants and transportation difficulties, last-minute deliveries can no longer be made with certainty.

"For these reasons the Department of Agriculture urges that spring needs be anticipated and that orders for lime be placed at once. Dealers and manufacturers should have advance information as to farmers' needs so that orders can be combined and car space used to the best advantage. Delay in ordering may result in failure to obtain the lime until too late.

"It is, moreover, the desire of the Railroad Administration that the season for delivery of lime, which has heretofore been from March to May, be extended to include the period from January to May, in order to relieve, as far as possible, the existing car shortage."

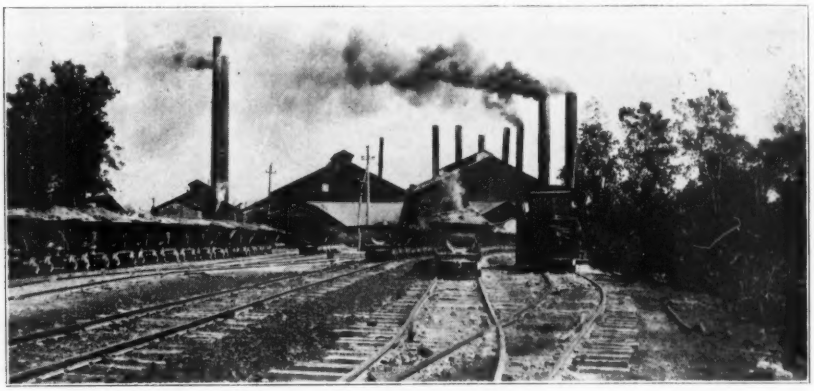
Slate Quarrying on Decline

THE USE OF SLATE for roofing is apparently on the decline, although a part of the falling off in production in recent years is due to war-time curtailment of building, according to a report recently issued by the United States Geological Survey, Department of the Interior. The major part of the slate produced in this country is, contrary to the general impression, used on the inside rather than the outside of buildings.

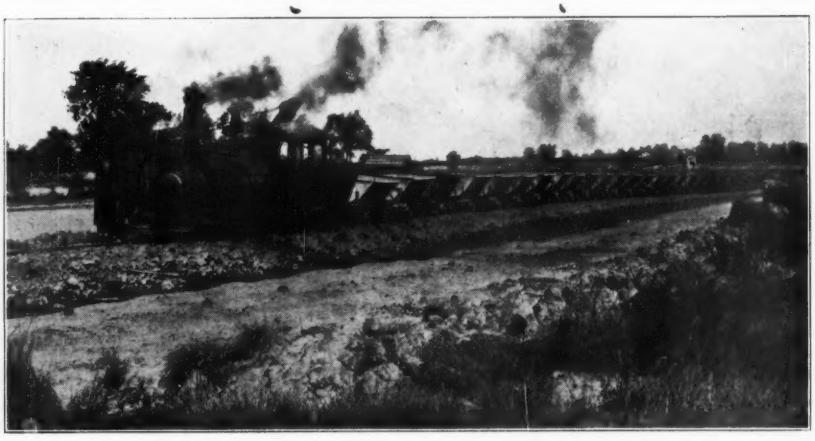
Ohio Marl-Shale Cement Plant

Castalia Portland Cement Co. One of Few Surviving American Plants Which Can Operate Without a Quarry

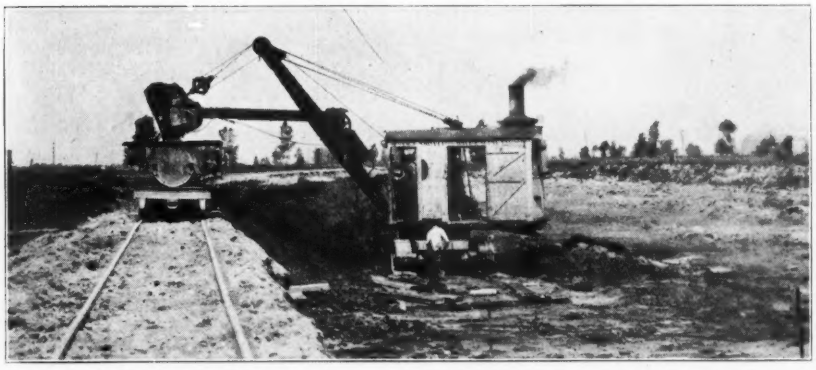
RISING COSTS of quarry labor, powder and crushing plant equipment have not affected one American cement company, which is said to be in a very prosperous condition. The Castalia Portland Cement Co., Castalia, Ohio. is still obtaining all its raw material from marl and shale banks by steam-shovel operations without resort to quarrying methods.



Yard terminal at mixing bins



Train loads of shale are hauled 2½ miles over company's tracks



Marl is excavated much the same as clay—no blasting

Marl Deposit

The marl bed is peculiar in that at one time the deposit was interrupted and a layer of 3 or 4 in. of organic material was deposited; this shows up in the face as a black streak, but does not cause any considerable difficulty in the manufacturing of cement, since all organic matter is burned out in the kilns. The deposit which is uncovered by the removal of several inches of sod is about 6 ft. deep and is easily removed by a steam-shovel operation.

The marl bed is 1½ mi. and the shale bed is 2½ mi. from the plant. This requires the construction and maintenance of several miles of standard gage railway track. One of the accompanying views shows the type of steel side-dump cars used for haulage.

The material is hauled to the plant in train loads of from 25 to 30 cars and left on the trackage at the dry-mix house. These tracks are so inclined that they will feed the cars by gravity to the end nearest to the mixing hopper. In order to get the mix as near the right proportions as possible, the raw material is analyzed each day at the pits and a ratio of mix is established.

Since the laborers employed at the mixing hopper are mostly foreigners, the following method is employed to insure no mistakes. Each day the chemist prepares as a result of his analysis a table. If the mix for the day is to be one car of shale to five cars of marl the table will indicate that cars Nos. 1, 2, 3, 4 and 5 are to be of marl and that car No. 6 is to be of shale, and so on.

Maintaining Constant Mix

After the mixed material has been through the usual process of ball and tube mills and is thoroughly pulverized and agitated in the first slurry tank, it is pumped to one of 19 small slurry tanks which are mounted on the second floor of the building. Samples of the slurry in these tanks are sent to the chemist and are analyzed. By the use of standard solutions and having a previously established constant which indicates the correct mix for the particular raw materials used, the mix of each of these tanks may be indicated.

Eight larger kiln supply tanks below the other tanks are provided so that the slurry from the small tanks may be fed by gravity into large tanks. Thus if one

of the small tanks analyzes below the constant for proper burning mix and another analyzes above, by mixing the two or possibly three in one of the larger service tanks the slurry may be adjusted and maintained at a constant mixture. This is constantly agitated and, as needed, is elevated by a chain bucket elevator to a long feed trough which supplies the kilns.

The Castalia Portland Cement Co., which has recently been reorganized and put on a firm financial basis, has the following officers: G. W. Hackett, president; J. T. Brooks, vice-president and treasurer; A. Murked, secretary; W. S. Kirkpatrick, general superintendent.

Forthcoming National Conference on Agricultural Lime

AT THE MEETING of the American Society of Agronomy in Chicago last month, the director of the Agricultural Department of the National Lime Association, introduced a resolution which was adopted by the society, looking to a national conference of agricultural investigators of liming in relation to soil and crop improvement.

The purpose is to bring all these men together to thoroughly consider this entire subject in a several days' meeting, to determine the present status of available information; the main lines that need investigation; the conditions under which such investigation can best be carried out.

The diversity in opinions on the value, forms and use of lime is due to difference in understanding of the available data and to differences in accuracy of thought about these things. Only by active conference and discussion, coupled with additional investigation. can anything like uniformity of teaching and sound practice be developed, says a statement issued by the National Lime Association.

I. C. C. Decision on Delayed Payment of Claims

THE INTERSTATE COMMERCE COMMISSION has issued a decision in the case of Jacob E. Decker & Sons vs. Director General of Railroads, et al, relative to the refusal on the part of the carriers to pay claims in which the two years and one day period has elapsed. The decision of the Commission was that the position of the carriers was unreasonable, unjustly discriminatory and unduly prejudicial. This means that in cases where the carriers have undertaken to repudiate claims where claims had not been filed within the two years and one day period, they will be expected to give them consideration and adjust them without regard to the two year and one day limitation.

New installation of slurry tanks

Far Reaching Rate Decision

Railroad Administration Wants Solvay Process Co. Case Reopened

REALIZING that the theory advanced in the Interstate Commerce Commission's decision in the Solvay Process Co.'s crushed-stone rate case is a general condemnation of whole advance in rates on such commodities made under General Order No. 28, R. V. Fletcher, on behalf of the Director-General of Railroads has asked for a rehearing or reargument.

Full details of this case were given in ROCK PRODUCTS, December 20, 1919, p. 15 and pp. 28-30. Attention was called to the breadth of the decision and its application to a thousand and one similar cases involving the movement of crushed stone, sand, gravel and slag. Evidently the decision is so interpreted by the Railroad Administration.

The condemnation of the rate on limestone used by the Solvay Process Co., Mr. Fletcher said, meant a return of $90,000 to that company, and amounted to a declaration, by the Interstate Commerce Commission, either that the money the President has said was needed to operate the railways is not needed, or that it was not properly raised.

If it was not properly raised, Mr. Fletcher argues, the implication is that rates on other commodities in other parts of the country were too low. It is now impossible for the Railroad Administration, he contends, to hunt out such rates that might be deemed too low and to increase them so as to bring in the necessary money. He said that the Solvay Process Co. decision, in effect, meant that millions in the form of reparation would have to be returned to shippers of low-grade commodities, although it was admitted of record that the President needed the money he tried to obtain when he increased the rates on low-grade commodities by specific cents per ton or per 100 lbs.

Mr. Fletcher argued that the reason for making the specific advances, instead of the 25 per cent increase, was to prevent the disruption of the rate relationships. If now the rates then made are to be changed, he continues, the whole scheme will be broken and the relationships that were intended to be preserved will be violated. He contended that there was nothing in the record to show that the scheme of specific advances was inherently wrong or not a fair way for the President to distribute the burden that had to be placed somewhere.

Analyzed by mineral aggregate producers, the argument of the Railroad Administration seems to be that the needed increase in railroad revenue justified soaking the shippers of mineral aggregates, because at the time they seemed less capable of resistance than the shippers of higher grade commodities.

In both the Birdsboro Stone Co. vs. the Pennsylvania R. R. Co., and the Solvay Process Co. vs. the Delaware, Lackawanna & Western R. R. Co. cases, it was proved that the per car mile or per ton mile revenue for the movement of crushed stone was much higher than the average per car mile or per ton mile revenue from all commodities (including stone) moved by the respective railroads. The latter figures are available from the railroad reports to the Interstate Commerce Commission, the former must be computed by the shippers themselves, as suggested in the article by Ben Stone.

THE LARGEST BRANCH of rock products industries to be organized for systematic accident prevention study and practice is the portland cement industry. A considerable part of the work of the Accident Prevention Bureau of of the Portland Cement Association in co-operation with the National Safety Council has been directed toward safety in quarrying, which is common to all the rock products industries. The Mining Section of the National Safety Council and the U. S. Bureau of Mines have both directed effort along this line, and a code of safe practices has been pretty thoroughly developed.

The major part of the research work remaining to be done in the rock products field appears to be safe-guarding plant operation in the ordinary type of semi-permanent plant at reasonable cost. The assistance of each and every reader is solicited to this end. If you have any special problems to solve at your own plant you are at liberty to submit them to the safety engineers of the National Safety Council through Rock Products.—Editor.

Cement Section of the National Safety Council

By F. M. Rosseland, Safety Engineer, National Safety Council, Chicago, Ill.

EARLY IN THE ORGANIZATION of the National Safety Council, it was recognized that the increasing number of members in the cement manufacturing industry warranted special meetings at the Annual Safety Congresses and special consideration. When the demand came, the Executive Committee of the Council readily provided for a strong program at each of the Annual Safety Congresses and for additional activities as the needs arose.

The first meeting of the Cement Section was held at the Fourth Annual Safety Congress in Philadelphia in 1915. The sessions were marked by interesting discussions which followed each of the carefully prepared papers on the accident hazards of the industry that were presented. Practically every phase of the cement plant accident problem is considered at the sessions of the Section each year and much valuable information on accident prevention, health, sanitation and allied subjects are brought out.

H. G. Jacobsen, manager of the Accident Prevention and Insurance Bureau, Portland Cement Association, was elected Chairman of the Cement Section at the Eighth Annual Safety Congress held in Cleveland, Ohio, October 1-4, 1919. Mr. Jacobsen and his predecessor in the Bureau, the late Robert Brinton Hill, have been strong, consistent boosters for accident prevention and the National Safety Council from the beginning. Their energetic efforts have brought splendid results in this great work of saving lives and limbs.

The Cement Section has a membership of approximately sixty companies, including the most progressive plants in the country. The membership represents plants employing approximately 20,000 cement workers and a total capitalization of approximately two hundred millions of dollars. Consider these figures and the hazards involved and you will realize the importance of systematic accident prevention work in the industry.

Members of the Council who operate quarries also receive the special bulletin service of the Mining Section of the Council.

Membership in the National Safety Council has much to offer of distinct value to cement manufacturers for the hazards of the cement industry are numerous and varied, and health and sanitation considerations demand constant attention. In this as in all other industries, the human element is an important factor. Even though all possible safeguards are installed and all the available devices for the protection of the health of the workers, and adequate equipment for the maintenance of sanitary conditions provided, it is still necessary to educate the worker to use the devices, appliances and equipment and more especially to do his work the safe way.

Educational Factor

Education in safety is a vital need of both employer and employee. In fact most cement manufacturers have long since realized that they as well as their workmen needed education along this line. Cement plant employees, like all other workers, require constant education, constant stirring up in safe practices. Splendid results in the latter have resulted from the safety committee work that many of the members are carrying on. An experienced cement manufacturer may direct proper methods for carrying on the various operations in the plant, but this solves only half the problem. The worker, though already familiar with the hazards involved in the operation, must be educated in the safe practices necessary to eliminate the hazard.

Generally speaking, the guarding required in a cement plant is but little different from that required in any manufacturing plant; belts and gears must be guarded; safety goggles must be worn in certain operations; respirators are desirable in certain operations; and safe working clothing must be worn.

The employer can secure from the Council complete information regarding mechanical safeguarding, sanitation, the protection of health and also many suggestions for the safety education of employees. In addition, the weekly bulletin service of the Council is an invaluable supplement to the educational efforts of the employer. Each member receives a fresh supply of bulletin board posters prepared by a staff of safety engineers specializing in this phase of safety work. Each month a safe practices pamphlet that contains the latest and best information for the prevention of accidents in certain specific operations or industries is sent to each member of the National Safety Council.

The use of explosives in quarrying has been treated in detail at the several sessions of the Cement Section. This subject will probably never be definitely settled, and each year members get new ideas for the prevention of accidents in that hazardous operation.

Information Bureau

The information bureau of the National Safety Council receives many inquiries from cement manufacturers concerning every conceivable phase of acci-

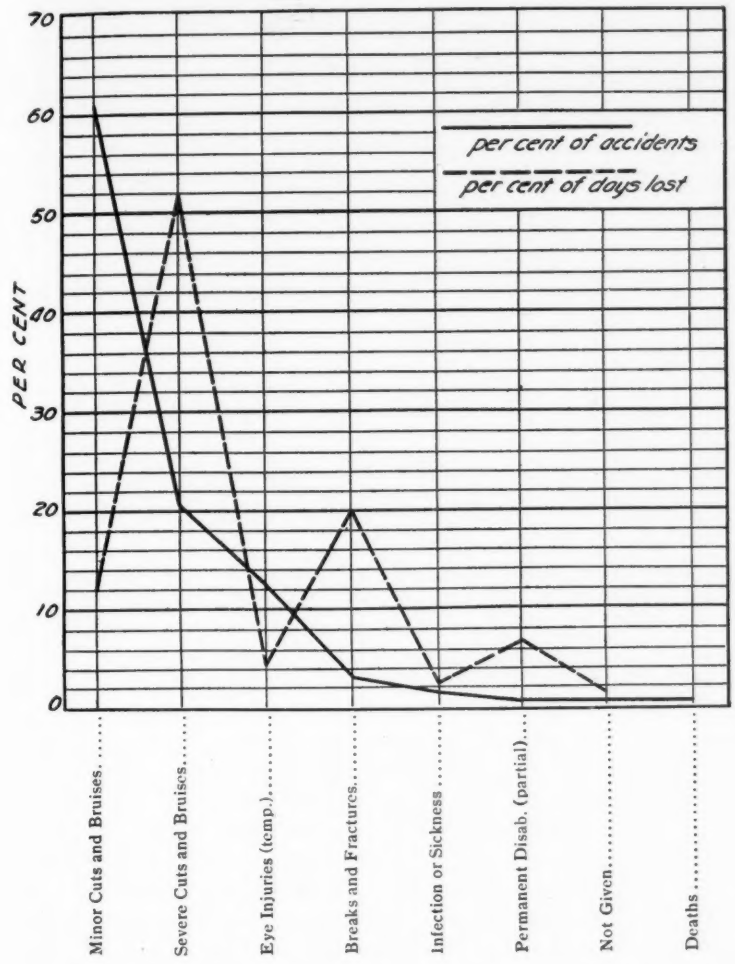


FIG. 3. PERCENTAGES OF ACCIDENTS AND DAYS LOST ACCORDING TO NATURE OF RESULT.

THE GRAPH above illustrates one of the studies made by the Bureau of Accident Prevention of the Portland Cement Association to determine the causes of accidents and the resulting time lost. It will be seen at a glance that more than half of the accidents were minor cuts and bruises, but that half of the time lost was for severe cuts and bruises. Minor cuts and bruises are hard to eliminate but the accidents which caused most of the lost time are the very ones that systematic accident work should be able largely to eliminate.

dent prevention and industrial relations generally. Either from the Council's library or by inquiry among the other members of the section, the answers to these questions are secured and transmitted to the inquiring member. This information bureau service, furnished free of charge, is considered by some members the most valuable part of the Council's work. It is doubtful, however, whether all members would agree on which part of the work was the most valuable; for from time to time each member finds some one phase exceedingly valuable in an emergency.

The records of members of the Cement Section definitely establish the fact that accidents in the industry can be reduced, the reduction varying of course with the degree of energy put forth.

You Cannot Prevent Accidents

BUT YOU CAN TEACH YOUR WORKMEN HOW TO PREVENT THEM FOR YOU

YOU MUST EDUCATE them because education is the basic law of successful accident prevention, education of the foreman and of the individual workman.

A slow process—perhaps—but a sure one; a process that will show a positive reduction at the outset and an ever increasing reduction in direct proportion to the sincerity behind it and the period of time that it is in operation.

HOW TO TEACH THEM

By membership in the National Safety Council—a noncommercial, nonprofit-making association of industrial concerns; by using its staff of engineers, its reference library—the largest accident prevention library in the world; by using its bulletins and Safe Practices Service.

EACH WEEK THE POSTMAN WILL DELIVER

A complete unit of educational material. Bulletins for your bulletin boards—to teach your foremen and workmen how to work safely. The National Safety News with its review of safety work the country over—to keep you in touch with helpful activity. And on a regular schedule, a Safe Practices Pamphlet for you or your superintendent—a publication, each issue of which covers some particular industrial process or operation from the handling of explosives to the operation of wheelbarrows and trucks or elevators—conveying concise practical information as to the prevention of accidents in that particular phase of your work.

Ask for one covering some bothersome hazard in your plant. Fill in the coupon at the bottom of this page. It will entail no obligation on your part. If we have one that applies, it will be sent free of charge. If not, we will give you such information as may be available. If it's to be had, we have it.

National Safety Council,
Dept, R. P. 2,
168 N. Michigan Ave., Chicago, Ill.
Gentlemen:
Please send me a Safe Practices Pamphlet covering.....
(Specify hazard or equipment or such other information as may be available.)
Name .....
Company .....
(Also classification, i. e., quarry, cement plant, etc.)
Address .....

Random Comments on the Issues of the Day

It is taken for granted that there must be increases in the 1920 prices of mineral aggregates—to make up for 1919 losses if nothing more. There are many ways of breaking the news to one's customers, but the following seems to be effective.

1920 Price Increases

A South Carolina sand and gravel company sends out a circular letter to its customers which states: "Owing to the increased cost of production, we are forced to increase the price of sand, effective January 15. The following price will prevail: 70 cents per net ton, f. o. b. plant. In connection with this price increase, we hope that in a measure it may be offset by a reduction in freight rates, after the railroads are returned to their owners, March 1, as under General Order No. 28 issued by the Railroad Administration, the P—— & N—— R. R. increased its freight rate on sand from our plant to G——, G——, A——, and S——, approximately 100 per cent."

A Southern States slag producer, in announcing his 1920 prices, states: "In an earnest desire to render helpful service to all users of slag, and particularly to help stabilize prices on building materials, we have established prices which will be maintained throughout 1920. Every quotation in the enclosed price list applies to all shipments to be made this year. Yes, Sir! You can bank on our protecting you on all 1920 contracts based on these figures."

One announcement puts the freight rate problem plainly up to the consumer, and diverts his attention from the price increase; the other eliminates at the very start any gamble on the season's price changes. Many quarry plants apparently are compelled to keep the first quoted prices from force of circumstances; then why not capitalize on that practice?

* * *

There is evidence of keener competition than ever between the various road building material interests. If all the roads which are contemplated are put under construction this season there will be work enough for all, provided all can get labor and materials and capital to pay for them.

Road Material Competition

It is being whispered about that the great demand for cement in concrete roads is going to make it hard for paving brick manufacturers to corral enough for their concrete foundations and mortar joints. It is also a well known fact that the most prominent builder of bituminous pavements in this country is casting about for a foundation material other than concrete.

Quarrymen are being wooed by both these interests in the hope of winning their support to promotional work for types of pavement, which have hitherto made extensive use of concrete. Consequently quarrymen are in a fair way to receive recognition as factors in the road-building game, in which hitherto they have been rather neglected or possibly overlooked.

* * *

One of the first really constructive plans for getting somewhere in the mineral aggregate freight-rate controversy is the contribution of Ben Stone, executive secretary of the Illinois and Chicago Sand and Gravel Producers' Associations, printed elsewhere in this issue.

Ben Stone on Freight Rates

Mr. Stone has put into specific terms what Rock Products has been harping on for several months past; i. e., the only way to combat the proposed rate increase or to get present rates lowered is to have an incontestable array of facts.

The Interstate Commerce Commission decisions in the Birdsboro Stone Co. and the Solvay Process Co. cases have furnished a good basis to determine what a reasonable profit on these commodities is. It is up to each and every producer to determine for himself whether his freight rate is above or below an amount necessary to yield the railroads a fair return.

While those who have unusually favorable rates can hardly be expected to ask to have them raised, it is obviously in the interests of the industry as a whole to have the matter of what a fair rate really is thrashed out once and for all. No man ought to ask or expect the railroads to take care of his traffic for less than it actually costs the railroad to do it.

* * *

This is the season of the year when association meetings and conventions in the mineral aggregate industries come thick and fast. There is very evident an increasing interest in these meetings and a growing appreciation of what the various associations have done, are doing, and what they aim to accomplish with proper support. No one nowadays questions the desirability of organization, but organization is only the first step in the progress of an industry. The next is to make the organization effective. Fortunately even in the short space of two or three years several associations have shown the way to do it.

Progress in Organization

* * *

Southern quarrymen are exercised over the proposal of the Federal Government to operate the Muscle Shoals, Ala., air-nitrate plant. The possibility of this operation resulting in unfair competition in the agricultural lime and limestone industry of the South was pointed out in Rock Products several months ago. It is obviously one of the many demonstrations of the necessity of national organization.

Government Competition

NEW MACHINERY AND EQUIPMENT

Machinery Needed for 1920 Production

THE INCREASING STRINGENCY of the labor market is making more and more demand for labor-saving devices. The only hope of a large production in 1920 is to increase the per man output. The two ways to accomplish this are increasing the efficiency of the worker by moral suasion and increasing his efficiency with mechanical aids.

Most operators have apparently given up hope of persuading laborers to work any harder, so the only alternative is to replace his labor altogether where possible. There is no shortage of skilled American labor and the operator of a machine is a skilled laborer.

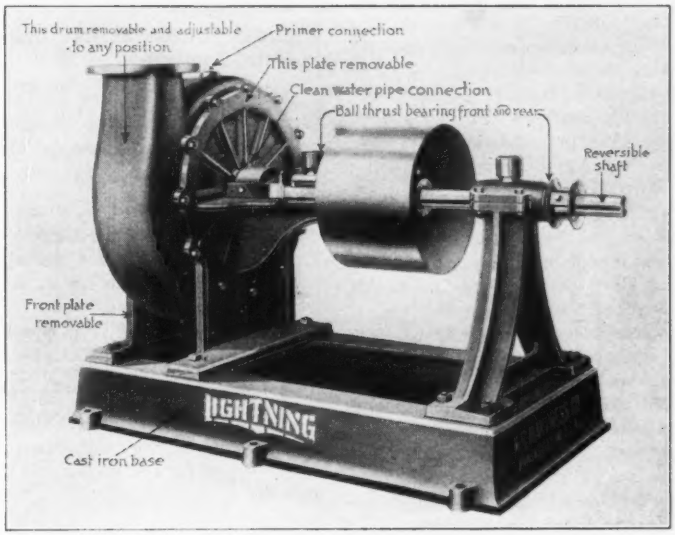
Sand and Gravel Pump with a History

THE SAND AND GRAVEL pump now being widely advertised by the Kansas City Hay Press Co., Kansas City, Mo., has an interesting history behind it. The present manufacturers of this pump were the contractors for the construction of the Galveston, Texas, sea wall. For the extensive sand dredging work involved the contractors came to designing and building their own pumps.

The manufacturers state:

"There are a few special features on these pumps that make them very desirable, and gives more efficiency, from the fact that practically all the parts of the pump are interchangeable.

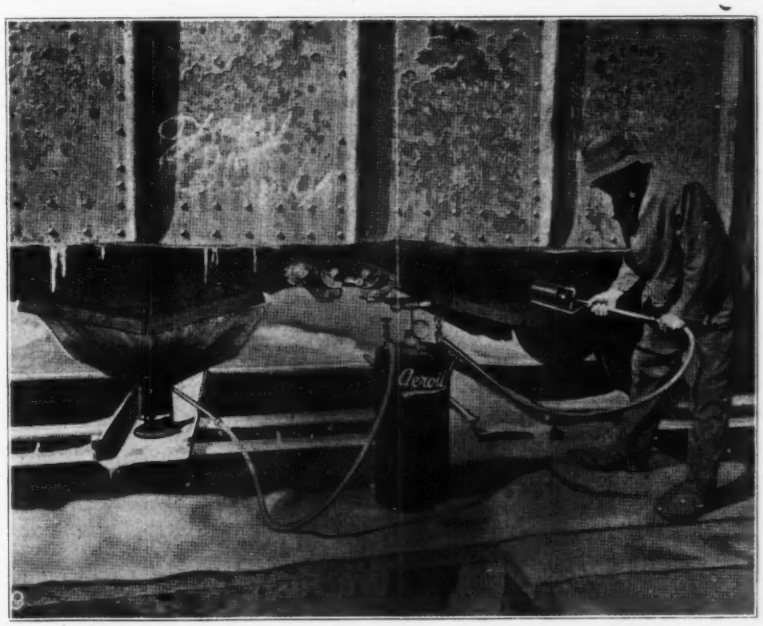
"The sides are removable, the drum is removable, and the shaft is double ended which makes it easily changed when it shows wear, and the end thrust on the shaft is taken care of by the ball thrust bearings. The pump discharge can be set at any angle the operator wants, by turning the drum between the two side shells. On the inside of the pump at the discharge point, we have a special reinforcement that is separate from the pump, and may be replaced. This is the point where the sand cuts the pump away especially, and when worn this reinforcement may be replaced at a small cost."



Sand pump developed on construction of Galveston sea wall

Car Thawing Torch

THE ACTIVITY of state highway engineers in getting bids and starting deliveries of crushed stone, sand and gravel during the winter weather will mean a lot of grief for the consignee unless he is equipped to unload frozen material. Of course, this is only indirectly the producers' problem, but it is well for him to know that this problem has been met and at least partially solved before in the handling of coal. The Aerial Burner Co., Union Hill, N. J., makes a torch for this purpose, which is illustrated herewith. The list price of this apparatus is from $110 to $120.



Thawing device for unloading cars of mineral aggregates

General News from Rock Products Markets

First Lime-Hydrating Plant in Cuba

W/M. J. KUNTZ, general manager of the Steacy-Schmidt Manufacturing Co., York, Pa., writes to ROCK PRODUCTS:

"For quite a number of years we have been trying to persuade the Cuban lime burners to put in hydrating plants, but until a month ago, our efforts produced no orders. We now, however, are able to advise that Jose Lazama, of Limonar, near Matanza, Cuba, has placed an order for a complete lime and hydrating plant for 40 ton daily capacity.

"The outfit will comprise two oil-fired Keystone kilns, with a steel incline for the haulage of the rock to the top of the kilns, the hoisting winch to be electrically operated. The hydrated lime plant will comprise a batch mixer, a batch hydrator, a Raymond feeder and mill, a Sturtevant crusher, a Bates bagging machine, with the necessary dust collectors and storage bins, the whole to be operated electrically and to be arranged for doubling the capacity.

"Our particular pride in this instance is not in the sale of the Keystone kilns, because we have four other installations in Cuba, but we feel highly elated in being the pioneers in placing the first modern hydrating plant in Cuba."

Minnesota Faces Busy Season

ANTICIPATING a record-breaking demand for crushed rock for building hard surfaced roads in Minnesota this year new rock crushing plants are starting up at several points in the State and highway engineers expect no difficulty in supplying needed materials, according to C. M. Babcock, State Highway Commissioner.

Largely owing to a short supply of crushed rock or washed gravel for the "coarse aggregate" ingredient for concrete roads, 58 miles of road which were to be constructed in the State last year could not be completed, and will be finished this year, in addition to 189 miles of new construction authorized, Mr. Babcock said recently. This makes a total of 247 miles of paved road to be constructed in 1920, not counting many miles of city paving.

Every mile of paved road, according to the State Highway Commission, takes approximately 2,000 cu. yds., or 2,700 tons, of crushed rock or coarse washed gravel. It also calls for 640 tons of cement and 1,000 cu. yds. of sand. Stated another way, the material for a mile of hard surfaced road requires 80 carloads of crushed rock, 20 cars of cement and 40 cars of sand.

To construct 247 miles of such roads means supplying 35,000 carloads of materials, nearly all of it requiring transportation by rail, and this presents another problem the State highway authorities are grappling with. Even last season they had great difficulty in getting cars to move the rock, sand and cement, and this year the construction will make much greater demands on railroad facilities. There is a shortage of open-top cars in this section, Mr. Babcock said, the northwestern roads having purchased box cars, depending partly on their connecting lines for hopper bottom and other open cars.

Moving road materials for Minnesota's 1920 program of hard surfaced roads will require the constant use of from 1,500 to 2,000 cars, according to the highway commissioner. This does not include the cars needed to transport sand and gravel for temporarily surfacing some 1,500 miles of the new road to be graded this year, or supplies needed for city paving work.

The crushed rock or gravel needed for Minnesota State road building alone this year will be approximately 667,000 tons, or nearly 20,000 carloads. To supply this, a number of new rock-crushing plants are being constructed. The State last year drew crushed rock from plants at St. Cloud, Duluth, New Ulm, Pipestone, Jasper, and at Dresser Junction, Wis. For the coming season additional plants at New Ulm, Pipestone, Jasper, Granite Falls, Ortonville, and Faribault are being constructed, while others are projected at Sartell, St. Cloud and other points.

Washed gravel supplies are limited, because much of the gravel contains soft material, and the bulk of the road materials, therefore, must be crushed rock, according to Mr. Babcock. Only the hardest stone is desired for this, such as the granite of the St. Cloud district, trap rock of the St. Croix valley, or the flint of the Pipestone district. Most of the material requires transportation for considerable distances.

Bear These Dates in Mind!

FEBRUARY 9, 10 and 11, the National Crushed Stone Association meets at the Seelbach Hotel, Louisville, Ky.

FEBRUARY 11 and 12, the National Association of Sand and Gravel Producers meets at the Sherman Hotel, Chicago, Ill.

THESE mineral aggregate industries face the biggest year yet, but they also face the biggest problems ever met with. Don't try to meet these problems single-handed. Join the crowd with the "big stick."

Winter Prices for Crushed Limestone

SUPPLEMENTING the article in ROCK PRODUCTS, December 20, 1919, page 16, on the innovation in expediting road building in Wisconsin by the state purchasing mineral aggregate for winter delivery, we are informed by the Falls Lime & Stone Co., Sheboygan Falls, Wis., that its bid was omitted from the tabulation published at the end of the article referred to. This bid was $1.15 per ton and has been accepted by the state highway authorities.

Canadian Cement Company Is Rapidly Expanding

AS AN indication of how the cement manufacturing industry is expanding in Canada, the enlargement of the plant of the St. Mary's Cement Co., Ltd., St. Mary's, Ont., is significant.

This company is now about seven years old, and ever since the plant was established, frequent enlargements have been necessary. During the present year a third kiln has been installed and a corresponding enlargement of the plant effected which will bring the output up from 600,000 to 900,000 bbls. per year. Operations on the larger scale were commenced about November 1, 1919, when the company saw sufficient business in sight to warrant the extension. The demand for cement in construction work of all sorts is now very heavy.

Factory, Home Building Boom Sweeps Country

NEW YORK—Residential, industrial, and other building contracts aggregating $2,800,000,000 will be awarded east of the Missouri and north of the Ohio river in 1920, as compared with $2,500,000,000 in the same territory during 1919, according to an estimate of the F. W. Dodge construction statisticians.

Prolongation of the building season into the winter was indicated, Mr. Miller said, by the amount of building contracts issued in the territory named during November, which showed a total above the average of the preceding months.

In the central west, which includes Illinois, Indiana, Wisconsin, Iowa, Michigan, and parts of Missouri, and eastern Kansas, contracts awarded amount to $878,955,000. For residences the amount is $267,516,000; for manufacturing buildings, $218,083,000, and miscellaneous, $393,356,000.

General News from Rock Products Markets

Canadian Road-Building Activities

GREAT ACTIVITY will be seen in Canadian road construction in the next five years. The Federal Government has set aside $20,000,000 to be granted to the provinces for trunk roads and general highway improvement. This will be distributed according to population. It is understood that the Quebec Government, which has spent $21,000,000 since 1912, has a road program involving an expenditure of $10,000,000. It is figured out that Canadian provincial and Dominion Governments will spend $50,000,000 in the next five years on good roads.

Recent reports show that in the last ten years the province of British Columbia has spent over $28,000,000 on the improvement of its roads and bridges. There are 14,623 miles of highways.

Ontario has 42,000 miles of roads. Township councils alone are now spending $2,000,000 a year on roads.

A. McGillivray, highways commissioner, states that 50 municipalities of Manitoba are now engaged in construction of good roads under the Good Roads Act. Road systems have been laid out in the province covering 4,300 miles of market roads and 450 miles of through roads. Up to the present $3,250,000 has been spent under the act. There are 12 municipalities which submitted by-laws at the December elections for debentures totalling $2,365,209 for building good roads. With government assistance this will mean an expenditure of about $4,100,000 if the by-laws were carried. The board had in view the construction of about 1,800 miles of provincial highways, but considers local roads of more immediate importance.

Prices of Building Material in Eastern Market Advance

BUILDING material price advances of today foreshadow the strength of the 1920 construction market as being somewhat greater than end-of-the-year outlook seemed to indicate, says the Dow service Daily Building Reports.

It is not usual for building material price changes to occur with any marked strength or unanimity in January. But if indications count for anything at all, the price changes upward reported this week are only partial steps to what is to develop within the next 90 days. Plaster board moved up 3 cents each and manufacturers advanced the price of common hydrated lime $1 a ton, which corresponds with the dealers delivered price change on job, New York.

What practically amounts to price advances, but which can only be classed as stiffening market conditions, applies to Hudson common brick, Portland cement and some kinds of lumber.

Shortage of road oil supply is forcing further pressure on cement producers who are withholding price advances now, it is said, mainly because of fear of competition from outside of the zones normally supplying this market.

Prices of building materials delivered on job sites, New York, at present as compared with those of a year ago this month tell something of the changing characteristics of the market. Most of these changes have recently occurred. The outlook for a general further price advancement is clear.

Big Building Prospects for Texas During 1920

FORT WORTH, Tex.—As a direct result of the oil boom in the territory tributary to Fort Worth, this city showed an increase of more than 800 per cent in building operations for the year 1919 over any previous year.

The total value of building permits issued during the year was approximately $18,500,000, as compared with approximately $17,000,000 issued by Dallas for the same period.

The plans for building activities in Dallas during the current year are very extensive, as are also those in Fort Worth. In Wichita Falls, Burkburnett, Ranger, Eastland and many other towns situated in and close to the oil fields the building records for 1919 were unprecedentedly large. In many instances the populations of the towns doubled, trebled and even quadrupled during the year.

It is apparent that the buildings erected during the year 1920 will be of a more substantial and permanent type than those of last year. In order to meet the demands of business and rapidly increasing population, many makeshift buildings were erected to serve temporary purposes. In San Antonio the building activities during the past year were confined chiefly to erecting new residences, in which the city shows a wonderful growth. The same is true of Houston, El Paso and Beaumont.

Everything points to an unusual amount of activity in all lines of building operations throughout the whole state during the present year.

Sand and Gravel Co. Buys Building Material Co.

THE MARLBORO SAND AND GRAVEL CORPORATION, which is a subsidiary company of the Alsen Cement Co. of America, Inc., New York City, has completed arrangements to purchase all the property and assets of the Atlas Building Material Co.

The Atlas Building Material Co. is one of the largest manufacturers of brick in this country, having two up-to-date plants, one located at Hudson, New York, and the other at Roseton, New York, with an annual capacity of over 30,000,000 brick.

With the control of this company and the Marlboro Sand and Gravel Corporation, which is successor to the John B. Rose Co., the Alsen Cement Co. of America, Inc., will be one of the leading factors in the building material business, having a yearly output of 1,000,000 barrels of portland cement, 500,000 cu. yd. of washed sand and gravel, and over 30,000,000 brick.

The arrangements to purchase the Atlas Building Material Co. were brought to a successful conclusion by M. H. Reiss, chairman of the board, J. W. Kittrell, vice-president and general manager, Leon M. Nelson and George A. Logan, counsel, for the Alsen Cement Co. of America, Inc.

Dutch Lime Manufacturers Visit This Country

A REPRESENTATION of the Dutch Lime Manufacturers' Association, in the persons of Messrs. H. C. M. Dolk, I. W. O. Clant, and P. F. van der Wallen, of Leiden, Holland, recently visited this country to secure information relative to the uses and applications of burnt lime products as developed in the United States. They made a special study of modern methods of manufacturing and handling lime, with a view to improving the Dutch lime industry so that it may be better prepared to meet the problems presented by the present reconstruction period.

The commission put itself in touch with the staff of the National Lime Association, through which an itinerary was arranged that enabled them to visit several of the most up-to-date plants in this country and to examine various types of kilns, hydrators, automatic handling devices and other means of modern lime production.

The visit of this commission is indicative of the aggressive co-operation of the Dutch Lime Manufacturers, and their tour of inspection was much facilitated by our own National Lime Association.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton. F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.		From stock, 1.50 per net ton, all sizes				
Burlington, Vt.	.75@1.00	2.50	2.50	2.00	2.00	.....
Chaumont, N. Y.	.....	1.75	1.65	1.35	1.25	1.25
Coldwater, N. Y.			Flux, 1.50@2.10			
Limekiln, Md.	1.25	2.10	2.00	1.75	1.40	1.25
North Leroy and Akron, N. Y.	1.00	1.00	1.00	1.00	1.00	1.00‖
Pittsburgh, Pa.	1.25	1.40	1.50	1.50	1.50	1.50
Redington, Pa.	1.00	1.10	1.10	1.10	1.10	1.10‖
CENTRAL:						
Alden, Ia.	.50	1.00	1.00	1.00	1.00	.....
Alton, Ill.	1.75@2.00	1.30	1.30	1.30	1.30	1.30
Bettendorf, Ia.			1.50 per cu. yd., all sizes			
Brillion and Sherwood, Wis.	.90@1.00	.....	1.00	1.00	.....	1.00
Buffalo, Ia.	.90	1.45	1.35	1.25	1.25	.....
Chicago, Ill.	1.20	1.60	1.20	1.20	1.20	1.20
Davenport, Ia.	1.50*	1.50*	1.50*	1.50*	.....	.....
Dundas, Ont.	.65	1.20	1.20	1.20	1.00	1.00
Eden and Knowles, Wis.	1.00	1.00	1.00	1.00	1.00	.....
Elmhurst, Ill.	1.00@1.25	1.00@1.25	1.00@1.25	1.00@1.25	1.00@1.25	1.00@1.25
Greencastle, Ind.	1.00@1.50	1.25	1.10	1.00	1.00	1.00
Hull, Canada	2.50	2.75	2.75	2.25	2.00	1,75
Illinois, Southern	2.00	1.50	1.50	1.50	1.50	.....
Krause, or Columbia, Ill.	1.30@1.80	1.10@1.40	1.10@1.50	1.10@1.40	1.00@1.20	1.00@1.20
Laumon, Wis.	1.25	1.25	1.25	1.25	1.25	1.25
Lima, Ohio	1.40	1.40	1.40	1.40	1.40	1.40
Moline, Ill.			1.50—2300 lbs. all sizes			
Montrose, Ia.	1.25	1.15@1.25	1.15@1.25	1.10@1.25	1.10@1.15	.....
Oshkosh, Wis.			1.40 per ton, all sizes			
Ottawa, Ont.	2.50	2.75	.....	2.25	2.00	.....
River Rouge, Mich.	.....	1.25	1.25	1.25	1.25	1.25
Sheboygan, Wis.			1.00 to 1.25 all sizes			
St. Louis, Mo.	.60	1.60	.....	.....	.....	.....
Stolle, Ill.	.....	1.30	1.30	1.30	.....	.....
Stone City, Ia.	.50	.....	1.60	1.50	1.40	.....
Toledo, Ohio, f. o. b. cars	1.60	1.90	1.90	1.80	1.60	1.60
Toronto, Canada	1.55	2.10	2.10	2.10	1.90	1.90
SOUTHERN:			These prices include 90c freight			
Brooksville, Fla.	1.00	.....	.....	2.80	.....	.....
Cartersville, Ga.	.....	2.20	2.10	2.00	.....	1.90
El Paso, Tex.	1.00	1.00	1.00	1.00	1.00	1.00
Fort Springs, W. Va.	.90	1.00	1.60	1.75	1.35	.....
Mascot, Tenn.	.....	1.00@1.25	.....	1.50	1.50	.....
Memphis Jct., Ky.			1.10@1.35, all sizes			
Winnfield, La.	.80	2.00	2.00	2.00	1.80	.....
WESTERN:						
Atchison, Kans.	.50	1.80	1.80	1.80	1.70	1.70
Blue Springs and Wymore, Neb.	.20	1.65	1.65	1.55	1.45	1.40
Kansas City, Mo.	1.00	1.60	.....	.....	.....	.....

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Baltimore, Md.	.....	.90	2.75	2.50	2.00	1.75
Bound Brook, N. J.	1.00@1.25	2.00@2.25	1.80@1.90	1.60@1.80	1.50@1.70	.....
Branford, Conn.	.80	1.50	1.50	1.20	1.10	.....
Birdsboro, Pa.	1.40	1.90	1.80	1.60	1.40	1.40
Castro Pt., Richmond, Cal.	.50*	.....	1.50*	1 50*	1.40*	.....
Dresser Junction, Wis.	.50	1.75	1.75	1 55	1.50	1.50
Duluth, Minn.	.75	1.75	1.50	1.15	1.15	.....
E. Summit, N. J.	2.00@2.25	2.25@2.50	2.00@2.25	1.75@2.00	1.75@2.00	.....
Glen Mills, Pa.	1.00	1.35	1.70	1.55	1.35	1.35‖
Millington, N. J.	1.80	1.80	1.80	1.60	1.00	.....
New Britain, Conn.	.80	1.30	1.25	1.20	1.00	.....
Westfield, Mass.	.60	1.20	1.10	1.00	.90	.80

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Dundas, Ont.—Flint	1.10	1.10	1.10	1.10	1.10	1.10
Little Falls, N. Y.—Syenite	.80	1.20	1.40	1.20	1.20	1.20‖
Middlebrook, Mo.—Granite	3.50	.....	1.75	1.75	.....	1.00‡
Portland, Maine—Granite	1.50	.....	.....	1.35	1.25	.....
Roseburg, Ore.	.....	1.50	1.25	1.05	1.00	1.00
Stockbridge, Ga.—Granite	.50	2.00	1.90	1.75	1.75	.....
White Haven, Pa.—Sandstone	.85	1.20	1.40	1.20	1.20	1.20‖
Granite	1.25	.....	1.50	1.50	1.50	.....

*Cubic yard. †Agrl. lime. ‖R. R. ballast. §Flux. ‡Rip-rap. a 3-inch and less.

Agricultural Limestone Wholesale at Plant, per Ton

EASTERN:

Coldwater, N. Y.—Analysis, 56.77% $CaCo_3$, 41.74% $MgCo_3$—80% thru 100 mesh; bulk	3.00
Ppr.	4.50
Chaumont, N. Y.—Analysis: $CaCo_3$, 92 to 98%; $MgCo_3$, 1.51%—(Thru 100 mesh); ppr., 4.00; bulk	2.50
Paper bags	4.00
Grove City, Pa.—Analysis: $CaCo_3$, 94.75%; $MgCo_3$, 1.20%—(70% thru 100 mesh); 80 lb. ppr., 4.60; bulk	3.25
Grove, Md.—90% thru 4 mesh; bulk	3,00
Jamesville, N. Y.—68% thru 100 mesh; 95% thru 50; 100% thru 20. Sacks, 3.75; bulk	2.25
Lime Kiln, Md.—50% thru 50 mesh; bulk	4.00
Walford, Pa.—(70% thru 100 mesh; 85% thru 50; 50% thru 50; 100% thru 4); sacked, 4.25; bulk	2.75
West Stockbridge, Mass. — Analysis: Combined carbonate, 95%—33% thru 200 mesh; 66% thru 100; 100% thru 40. Bulk	2.85
Williamsport, Pa. — Analysis, $CaCo_3$, 88-90%; $MgCo_3$, 3-4%—(50% thru 50 mesh); bulk	3.00
Bags	4.50
CENTRAL:	
Alton, Ill.—Analysis: $CaCo_3$, 96%; $MgCo_3$, 0.75%—90% thru 100 mesh.. 50% thru 50 mesh	3.00 2.00
Bedford, Ind.—(90% thru 10 mesh) Analysis, $CaCo_3$, 98.5%; $MgCo_3$, 0.5%	1.75
Belleville, Ont.—Analysis, $CaCo_3$, 90.9%; $MgCo_3$, 1.15% (45 to 50% thru 100 mesh; 61 to 70% thru 50 mesh); bulk	2.50
Chicago, Ill.—Analysis, $CaCo_3$, 53.63%; $MgCo_3$, 37.51%—90% thru 50 mesh	1.00
Columbia, Ill., near East St. Louis —(¼" down)	1.25@1.80
Ellettsville, Ind.—Analysis, Carbonate, 98%	2.00
Elmhurst, Ill. — (Analysis, $CaCo_3$, 35.73%; $MgCo_3$, 20.69%) 50% thru 50 mesh	1.25
Greencastle, Ind.—(Analysis, $CaCo_3$, 98%) 50% thru 50 mesh	1.75
Howenstein, O.—100% thru 10 mesh; 59% thru 50; 39% thru 100	2.75@3.00
Lannon, Wis.—(90% thru 50 mesh) Analysis, 54%, $CaCo_3$; 44%, $MgCo_3$	2.00
Marble Cliff, O.—(50% thru 100 mesh) Analysis, $CaCo_3$, 86%; $MgCo_3$, 8%..	2.50
Marblehead, O. — (Analysis: $CaCo_3$, 95.33%) 100% thru 100 mesh, sacks, 4.75; bulk	2.75
McCook, Ill.—Analysis, $CaCo_3$, 54.10%; $MgCo_3$, 45.04% — 100% thru ¼" sieve; 78.12% thru No. 10; 53.29% thru No. 20; 38.14% thru No. 30; 26.04% thru No. 50; 16.27% thru 100	.90@1.00
Milltown, Ind.—Analysis, $CaCo_3$, 94%; $MgCo_3$, 3%	1.50
Montrose, Ia.—(90% thru 100 mesh)..	1,25
Muskegon, Mich.—(90% thru 50 mesh) Analysis, $CaCo_3$, 53.35%; $MgCo_3$, 43.27%	2.50
Piqua, O.—Analysis: $CaCo_3$, 82.8%; $MgCo_3$, 8.2%; neutralizing power in terms of calcium carbonate, 95.3%—70% thru 100 mesh; bulk	2.75@4.50
Rockford, Ill. — Analysis, $CaCo_3$, 53.75%; $MgCo_3$, 44.35%	1.25
Stolle, Ill. (near East St. Louis on I. C. R. R.)—(Thru ⅛" mesh) Analysis, $CaCo_3$, 89.61 to 89.91%; $MgCo_3$, 3.82%	2.00
St. Paul, Ind.—Analysis, $CaCo_3$, 85%; $MgCo_3$, 12%	1,50
Stone City, Ia.—Analysis, $CaCo_3$, 98% (90% thru 50 mesh)	.50
Toledo, O.—Analysis, $CaCo_3$, 52.72%; $MgCo_3$, 43%—(20% thru 100 mesh; 30% thru 50; 80% thru 100; 100% thru 5/32 screen)	1.80

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Agricultural Limestone Wholesale at Plant, per Ton

(Continued from preceding page.)

Whitehill, Ill. — Analysis, $CaCo_3$, 96.12%; $MgCo_3$, 2.50%—	
90% thru 50 mesh, bulk	2.00
90% thru 100 mesh	5.00
SOUTHERN:	
Brooksville, Fla.—50% thru 50 mesh	2.80
Cartersville, Ga.—Analysis: 96 to 98% combined carbonates—All thru 10 mesh with all dust in	2.50
Dittlinger, Tex. — Analysis, $CaCo_3$, 99.09%; $MgCo_3$, .04%.	
90% thru 100 mesh	2.00
90% thru 4 mesh	1.00
Grovania, Ga.—Analysis, $CaCo_3$, 95%; $MgCo_3$, none—50% thru 100 mesh	3.25
Hopkinsville, Ky.—Analysis, 94.6 to 98.1% $CaCo_3$—Bulk	2.00
Knoxville, Tenn. (pulverized limestone)	2.50
(90% thru 100 mesh)	2.00
Memphis Jct., Ky.—(Analysis, $CaCo_3$, 95.31%; $MgCo_3$, 1.12%) average price, ½ in. down	2.00
Mascot, Tenn.—Analysis, $CaCo_3$, 52%; $MgCo_3$, 38%.	
(80% thru 100 mesh)	2.50
(All thru 10 mesh)	2.00
80% thru 200 mesh	3.50
Paper bags, $1.50 extra per ton; burlap, 2.00 extra per ton.	
Maxwell, Va.	2.50
Mountville, Va.—Analysis, $CaCo_3$, 76.6%; $MgCo_3$, 22.8%—100% thru 20 mesh; bulk	4.75
100 lb. ppr sacks	5.75
Ocala, Fla.—Analysis, $CaCo_3$, 98%—(75% thru 200 mesh)	4.50
Tyrone, Ky.—Analysis, $CaCo_3$, 93%; $MgCo_3$, 6%—90% thru 4 mesh	2.25
Winnfield, La.—(50% thru 50 mesh)	3.00
WESTERN:	
Cement, Calif.—50% thru 50 mesh	4.00
Colton, Calif.—Analysis: $CaCo_3$, 95%; $MgCo_3$, 1½%; bulk, 2.50; bags, Sacks, 15c extra, returnable.	3.50
Kansas City, Mo., Corrigan Sid'g—50% thru 50 mesh; bulk	1.35

Miscellaneous Sands per Ton at Plant

Silica sand is quoted washed, dried and screened unless otherwise stated.

GLASS SAND:	
Berkeley Springs, W. Va.	2.10
Special hand selected rock	2.50
Cedarville and South Vineland, N. J.—	
Glass, damp	2.00
Glass, dry	2.50
Gray Summit, Mo.	2.00@2.50
Guion, Ark.—Contracts	1.75
Carlots	2.00
Klondike and Pacific, Mo.:	
Contracts	2.00
Car lots	2.50
Mapleton, Pa.	2.50
Glass, damp	2.00
Massillon, Ohio	3.00
Michigan City, Ind.	.30@ .50
Millington, Ill.—Contracts	2.00
Mineral Ridge, O.	2.75
Montoursville, Pa.—Green, washed	1.50
Oregon, Ill.—Large contracts	1.75
Open market	2.50
Ottawa, Ill.—Without contracts	2.00@2.50
Robinson, Md., washed, screened, not dried	2.00
St. Marys, Pa.—Green	2.50
Sands, Elk Co., Pa.—Selected, green	2.50
Thayer, W. Va.—Washed	2.50
Unwashed	2.00
FOUNDRY SAND:	
Albany, N. Y.—Core	1.50@2.25
Molding fine	2.50
Molding coarse	2.50
Brass molding	2.50
Sand blast	2.75@4.00
Allentown, Pa.—Core	1.50@1.75
Molding coarse	1.50
Arenzville, Ill.—Molding fine	1.50
Bowmantown, Pa.—Core	1.25
Furnace lining	2.50
Molding, fine and coarse	1.50
Cleveland, O.—Core	1.00@1.50
Molding fine, molding coarse	1.75@2.25
Brass molding	1.75@2.25
Sand brick	1.00@1.25
Columbus, O.—Core	2.00
Brass molding	2.50
Molding fine, steel molding	2.50
Conneaut, O.—	
Molding fine	2.75@3.00
Molding coarse	2.50@2.75

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Wholesale Prices of Sand and Gravel

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and less
EASTERN:						
Ambridge, South Heights, Pa.		1.00		1.00	.80	.80
Attica, N. Y.	.65	.65	.65	.75	.75	.75
Concord Jct., Mass.	1.00	1.00	1.25	1.25	1.25	1.25
Farmingdale, N. J.		.75				1.50
Hartford, Conn.	.90		1.25	1.15	1.15	1.15
Morristown, N. J.	.60	.60	1.20	1.00	1.00	
Pittsburgh, Pa.		1.00	1.25	1.00	.80	.80
Portland, Me.	.50	1.50		1.35	1.25	
Yardsville, N. J.			.50@ .75, all sizes			
CENTRAL:						
Alton, Ill.	.60@ .75	.60@ .75	1.50@4.50	1.30	1.20	1.20
Anson, Wis.		.60		1.25@1.50		1.00@1.25
Attica, Covington, Silverwood, Ind., Palestine, Ill.	.75	.75	.75	.75	.75	.75
Barton, Wis.	.85	.80	1.00	.80	.80	.80
Beloit, Wis.			.50 sand, .70 gravel			
Chicago		1.25@1.50	1.10@1.25	1.10@1.25	1.10@1.25	1.10@1.25
Columbus, O.		1.00	1.00	1.00	1.00	1.00
Covington, Ind.	.75	.75	.85	.75	.75	.75
Des Moines, Ia.	1.00	.75	1.65	1.65	1.50	1.50
Earlestead (near Flint), Mich.	.60	.60				.70
Eau Claire, Wis.					1.10	
Elgin, Ill.		.80	1.00	.80	.80	.80
Escanaba, Mich.		.90	1.60	1.20	1.00	.90
Ft. Jefferson, Mechanicsb'g, O.	.50@ .60	.50@ .60	.50@ .60	.60@ .70	.60@ .70	.60@ .70
Grand Rapids, Mich.	.50	.60	1.00	.90	.80	.80
Hersey, Mich.	.50	.60	1.10	1.10	1.10	
Indianapolis, Ind.	.60	.60		1.50	.75	.75
Janesville, Wis.	.65	.65		.75		
Milwaukee, Wis.	.70	.70	.80	.80	.80	.80
Saginaw, Mich.	1.00	1.10	2.10	1.95	1.95	1.85
		(Includes freight rates .60 to .80 per ton)				
St. Louis, Mo., F. O. B. cars		1.35	1.60	1.45		1.40
Summit Grove, Ind.	.75	.75	.75	.75	.75	.75
Terre Haute, Ind.	.75	.75		.85	.75	.75
Toledo, Ohio			.60, all sizes			
Yorkville, Moronts, Oregon and Ottawa, Ill.	.75	.75	.75	.75	.75	.75
SOUTHERN:						
Knoxville, Tenn.	.85	.85	.85	1.50	1.50	1.25
Lake Weir, Fla.		.60				
Macon, Ga.		.75@1.00				
Pelzer, S. C.	.70	.70				
Pine Bluff, Ark.	1.25	.92		Concrete gravel 1.30		
Roseland, La., and Condron, Miss.		.50			1.25	
Thomas, La.	.60					1.75
Valde Rouge, La.		.80				1.25@1.50
Waco, Texas.		.70			1.10	1.10
WESTERN:						
Kansas City, Mo.	.60	.60	(Kaw river sand .60 per ton carlots)			
Lincoln, Neb. (on cars)	1.00	1.00	2.10	2.10		1.90
Pueblo, Col.	.80*	.60*		1.50*		
San Francisco, Cal.	1.25	1.25	1.50	1.15	1.15	1.15
Saratoga, San Jose, Calif.		.60@ .75	.60@ .70	.60@ .70	.60@ .70	.60@ .70
Seattle, Wash.	1.25*	1.25*	2.00*	1.25*		1.25*
Vancouver, Wash.		1.30*	1.45*	1.30*		1.10*
Yorkville, Ore.	.60	.60@ .75	.70	.60@ .75	.60	.50@ .60

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and less
EASTERN:						
Boonville, N. Y.	.75	.75				
Burnside, Conn.	.80*					
Fishers, N. Y.			.70@.75 per ton, all sizes			
Yardville, N. J.		.50@ .75				
York, Pa.		1.00@1.10	(crushed rock sand)			
CENTRAL:						
Attica, Covington, Silverwood, Ind., Palestine, Ill.	.60	.60	.60	.60	.60	.60
Earlestead, (near Flint, Mich.)			.60 per yd.			
Eau Claire, Wis.					.75	
Escanaba, Mich.			1.00 cu. yd., all sizes			
Grand Rapids, Mich.	.40			.75		.60
Hersey, Mich.	.40	.50	.60	.60	.60	
Illinois, Northern						.50@ .60
Janesville, Wis.					.35	
Oxford, Mich.			Including cobbles, $1.00 per yd.			
Rockford, Ill.			Sand and Gravel mixed, .55@.65			
Saginaw, Mich. (Incldg. frt.)	1.40	1.40	1.40	1.40	1.40	1.40
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Wabash Valley District, Ind.			.60 for all sizes			
Winona, Minn.			Pit run gravel under 2-in., .70			
Yorkville, Moronts, Oregon and Ottawa, Ill.	.60					
SOUTHERN:						
Albany, Ga.	.70@1.00					
Dudley, Ky. (Crushed Sand)		.95		1.00		
Gravel Siding, Miss.			Mine run 45c per ton			
Knoxville, Tenn.	.90	.90	1.50	1.50	1.50	1.30
Lindsay, Tex.	1.00					.50
Pine Bluff, Ark.			Road gravel .45			
Thomas, La.						.40@ .70
Valde Rouge, La.						.60@ .75
WESTERN:						
Pueblo, Col.		.60*	River Run, .60 unscreened			
Saratoga, San Jose, Calif.		.60@ .75	.60@ .70	.60@ .70	.60@ .70	.60@ .70
Yorkville, Ore.		.40			.40	

* Cubic yard. B Bank. L Lake. || Ballast.

Crushed Slag Wholesale at Plant Per Ton

City or shipping point	Roofing	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:							
Bethlehem and Emaus, Pa.	2.50	.85	1.50	.85	.85	.85	.85
Buffalo, N. Y.	2.00	.95	.95	.95	.95	.95	.95
Cleveland, Ohio.		.85		1.05	1.05	.95	.95
E. Canaan, Conn.	4.00	1.00	1.50	1.25	1.10	1.10	1.10
Erie, Pa.	1.75	.85@1.00	1.00@1.50		1.00	1.00	1.00
Emporium, Pa.		1.00	1.00		1.00	1.00	1.00
Ensley, Ala.	2.05	1.00	1.25	1.25	1.25	1.00	.95
Hokendaugua and Topton, Pa.	2.50	.85	1.50	.85	.85	.85	.85
Lebanon (Donaghmore), Pa.	2.50	.85	1.50	.85	.85	.85	.85
Philadelphia Dist.	2.50	.75	1.50	.85	.85	.85	.85
Pittsburgh, Pa., Dist.	2.05	1.10	1.50	1.10	1.10	1.10	1.10
Sharpsville, Pa.	1.75	1.00	1.25	1.00	1.00	1.00	1.00
CENTRAL:							
Chicago, Ill.	All sizes, $1.50, F. O. B. Chicago						
Detroit, Mich.	All sizes, 1.65, F. O. B. Detroit						
Ironton and Jackson, O.	2.00	1.25	1.50	1.25	1.25	1.25	1.25
Toledo, O.	All sizes, 2.00, F. O. B. Toledo						
Youngstown, Sharpsville, Hubbard, Leetonia, O.	2.00	1.10	1.50	1.10	1.10	1.10	1.10

Agricultural Lime and Hydrate at Plant Per Ton

	—Agricultural Lime— Bulk	Bags	Per Cent CaO	Per Cent MgO	Agricultural Hydrate Bags
EASTERN:					
Adams, Mass.		7.50@8.00	65		
Apollo, Pa.		3.25	95.14	1.44	
Bellefonte, Pa.		7.00	98.5	.72	
Berkeley, R. I.		14.00	45	15	
Bridgeport, Pa.	7.50@9.00		55	44	9.00@11.00
Cavendish, Vt.		2.50 bbl. in car lots			
Cavetown, Md.	8.50				
Cedar Hollow, Devault, Rambo and Swedeland, Pa.	8.00	10.75 grd.	58	38	10.75
Chippewa, Pa.	5.50@6.00		78.67	1.33	
Farnams, Mass.	5.50	7.50		0-2	
Frederick, Md.	7.75		88	5 to 8	10.50
Grove City, Pa.	3.25	4.50	94.75	1.20	10.25
Grove, Md.	8.00				10.75
Highgate Springs, Vt.		8.00	85	2	
Hollidaysburg, Pa.	5.50@8.00		94.68		
Hyndman, Pa.	5.00	8.50	80.23	2.87	
Lime Bluff, Pa.	5.00@6.25		78.67	1.33	
Lime Kiln, Md.	8.00	10.75			10.75
Lime Ridge, Pa.	5.00@6.25		80.56 to 62.56	3.87 to 1.75	
Newburgh, N. Y.			57	38	8.00
New Castle, Pa.	3.50	4.50	47.6 to 50.4	0.62 to 1.12	
Paxtang, Pa.	5.00		60	12	
Rosedale, N. Y.	8.00		96	5	(Bulk, 6.00)
Sandville, O.					9.00
Steuben, Pa., Dover Plains, N. Y., York, Pa.		7.00@9.50	70		10.75 to 12.00
Union Bridge, Md.	8.50		73	1	10.75
Williamsport, Pa.	5.50	10.00	65 to 80	2 to 4	10.00
Williams Station, Pa.	7.50		60.6	39.1	9.75@10.50
York, Pa.	8.00		90 to 95	2 to 7	10.75
CENTRAL:					
Alton, Ill.	10.90		94.0		
Delaware, O.			61.09	9	9.75
Forest, O.	7.50				
Knowles, Wis.		10.00	55	45	9.50
Manistique, Mich.	10.00@11.00		95	2	12.00@13.00
Marblehead, Ohio			54	16.0	9.75
Mitchell, Ind.	9.00				11.00
Springfield, Ohio			33.62	17.73	10.50
Woodville, Ohio		9.25	46 to 48	30 to 34	10.25
SOUTHERN:					
Blowers, Fla.	5.00	7.25	98.0		
Burns, Tenn.	9.00		96	0.54	12.00
Chippewa, Fla.	5.00		80.0	15.0	
Dittlinger, Texas		9.00@11.00	98.62	0.29	12.50@15.00
Erin, Tenn.	8.00		97.82	0.12	
Karo, Va.	8.00		97.0	1.26	
Lineton, Va.	8.50		97	1.74	
Lushing, Va.	9.00	11.25	60	15	12.75
Maxwell, Va.	5.00		84	1.75	
Newala, Ala.	8.50@9.00		99.33		
Ocala, Fla.	4.00	6.00 pulv.	98½ (dry basis)		
Staunton, Va.	7.50		96.48		
WESTERN:					
Bellins, Wash.					12.00
Colton, Calif.	4.50		97	2	15.00
Lime, Ore.	15.00		91.48	0.58	
Oscas Island, Wash.		5.50			16.50
San Francisco, Calif.					15.00
Tehachapi, Cal.	6.00	8.00	96	2	

Miscellaneous Sands per Ton

(Continued from preceding page)

Eau Claire, Wis.—Core	2.25
Brass molding and sand blast	2.25
Fleetwood, Pa.—Furnace lining	2.25
Franklin, Pa.—Traction	2.25
Brass molding	2.75
Molding fine, steel molding	2.00
Molding, coarse	2.00@2.50
Sand blast	3.50
Core	2.00
Klondike and Gray Summit, Mo.—Molding fine	1.50@2.50
Greenville, Ill.—Molding coarse red	1.60@1.80
Guion, Ark.—Filter	2.50
Hancock, Md.—Core and brass mldg.	1.65
Hellam, Pa.—Core	2.00
Joplin, Mo.—Stone sawing, flint	1.25
Kansas City, Mo.—Missouri River core	.85
Leesburg, Pa.—Core, furnace lining, molding fine and coarse	2.00
Mapleton, Pa.—Molding, fine and core, damp	2.00@2.50
Molding, fine, dry	3.00
Massillon, O.—Steel molding coarse	2.50
Molding fine	2.50
Molding coarse	2.50
Traction	2.50
Furnace lining	3.00
Core	2.50
Michigan City, Ind.—Core, bank	.40@ .50
Millington, Ill.—Roofing, stone sawing	2.00
Core and furnace lining	1.75
Core	1.50
Mineral Ridge, O.—Core, molding, sand blast, roofing, brass molding, etc., washed, screened (damp)	2.10
Montoursville, Pa.—Core	1.25@1.50
Traction	1.15@1.35
Brass molding	1.25
Ohio—Various points:	
Iron molding, fine	1.50@2.25
Iron molding, coarse	1.75
Brass molding, minimum	2.00
Oregon, Ill.—Core	2.25@2.50
Furnace lining	2.00@2.25
Sand blast	2.75@3.00
Molding fine	2.00
Ottawa, Ill.—Sand blast	3.00
Core, furnace, steel molding	2.50
Roofing sand, molding coarse	2.50
Stone sawing, traction	2.50
Brass molding	2.00@2.50
Providence, R. I.—Molding fine	2.00
Molding coarse	1.90
Brass molding	2.25
Sand blast	3.00@4.00
Sugar Grove, Ohio—Core (dried and screened)	2.00
Traction	2.00
Thayers, Pa.—Core and traction	1.75@2.00
Furnace lining, molding	1.25
Utica, Pa.—Core	2.00
Molding coarse, traction	2.50
Brass molding	2.75
Sand blast	3.50
Warwick, O.—Core	2.25
Furnace lining	2.25
Molding fine	2.25
Molding, coarse	2.25
Traction and brass molding	2.25
Wedron, Ill.—Core, (crude silica)	.75@1.00
Molding fine, coarse	.75@1.00
West Albany, N. Y.—Molding fine	1.75@2.25
Molding coarse	1.50
Brass molding	1.75
Zanesville, Ohio—Molding fine and brass	2.00@2.50
Molding coarse	1.75@2.25

Gypsum, per Ton, at Plant

Castalia, O.—Crushed, to cement mills	3.50
Ground, to cement mills	3.50
Land plaster	6.00
Bags extra—Jute, 3.00; ppr., 1.00 per ton.	
Fort Dodge, Ia., bulk	3.50
Garhutt, N. Y.—Land plaster, bags	7.00
Grand Rapids, Mich.—Crushed gypsum	7.00
Ground gypsum rock	9.00
Gypsumville, Man., Can.	3.00
Oakfield, N. Y.	7.00
Sandusky, O.	6.00

Jute sacks, $3.00 extra; paper, $1.00 extra.

Ground Rock Phosphate at Plant, per Ton

Centerville, Tenn.—B. P. L., 70%; ton, 2000 lbs. (90% thru 100 mesh)	9.00@10.00
Lump rock, 72% to 75%, B. P. L.	6.00@8.50
Centreville, Tenn.—B. P. L., 60%	7.00
B. P. L., 60% to 70%	7.00@9.00
Gordonsburg, Tenn.—B. P. L., 72%; ton, 2240 lbs. Ground 90% thru 100 mesh	8.50
Lump rock	6.00@7.50
Mt. Pleasant, Tenn.—(B. P. L. 68%) 13%	7.00
14%	8.00
Mt. Pleasant, Tenn.—B. P. L., 70%	9.50
Nichols, Fla.—Pebble, B. P. L., 68%	10.00
Wales, Tenn. (95% thru 100 mesh) (guaranteed 14% phosphorus equivalent)	8.25
Walls, Tenn.—B. P. L., 70.2%—	
To County Agri. Assns.	7.50
To others	7.75

Florida Soft Phosphate

Croon, Fla.—Ground pebble, 30%	16.00
Pulverized soft, 26%	17.50
Jacksonville (Fla.) District	10.00@12.00
(Add 2.50 for sacks)	
Phoslime, Fla. (in burlap bags, 100-200 lbs.)	15.00

Passed By The Screens

Incorporations

The **Crawley Ridge Gravel Co.**, Little Rock, Ark., has been incorporated under the laws of the State of Arkansas.

The **Ozark Timber and Stone Co.**, Little Rock, Ark., has been incorporated under the laws of the State of Arkansas.

The **American Fuller's Earth Refining Co.**, Little Rock, Ark., has been incorporated under the laws of the State of Arkansas.

The **American Portland Cement Co.**, Little Rock, Ark., has been incorporated under the laws of the State of Arkansas.

The **Southern Phosphate Corporation** has been incorporated under the laws of the State of Delaware with a capital of $30,000,000.

The **Newport Crushed Stone Co.** has been incorporated under the laws of New York to own and operate stone quarries. The capital is $50,000.

The **Grand Rapids Sand and Gravel Co.**, Grand Rapids, Wis., has been incorporated to own and operate sand and gravel pits and to deal in sand and gravel. The capital is $15,000 and the incorporators are Fred Bossert, L. Amundson and E. C. Bossert.

The **Luckey Lime and Supply Co.**, Luckey, Ohio, has been incorporated for the purpose of manufacturing lime. The plant erected has a daily capacity of 150 tons. H. W. Nieman is treasurer and W. L. Kinstiner is fiscal agent of the new company.

The **D. W. Harding Sand and Gravel Co.**, Minneapolis, Minn., has been incorporated for the purpose of owning and operating gravel pits manufacturing cement blocks and marketing such products. The capital is $100,000 and the incorporators are: D. W. Harding, president; R. W. Duff, vice-president; E. P. Lindman, secretary and treasurer.

Limestone Products Co., of Mifflinburg, Pa., has been incorporated to own and operate stone quarries and market the product. The firm has purchased an old quarry south of Mifflinburg and will install the most improved quarry machinery obtainable. The entire plant will be operated by motor drive. Although the output is rather large it is stated that orders already booked will consume the coming year's product. The officers of the company are: De Briceon Harter, president; G. M. Schall, treasurer; W. D. Kochersperger, manager and secretary.

Personals

Frank P. Jones, general manager of the Canada Cement Co., has resigned from the directorate of the Canadian National Railways, owing to the pressure of other duties.

J. H. Coley, who has been head salesman and sales manager for the Geo. D. Whitcomb Co., Rochelle, Ill., for the past seven years, has resigned from those offices and has several matters under consideration.

W. G. H. Carn has been appointed electrical and power engineer for the Canada Cement Co., Montreal. He was formerly engaged in the design and construction of lighting and power systems in the Montreal district.

E. L. Kelzer is in charge of the 20 W. Jackson Blvd., Chicago, office of the John F. Byers Machine Co., Ravenna, Ohio. This Chicago district office has been but recently opened so that the central states clientele will get better mechanical and sales service.

William J. Thornton resigned his position with the Connecticut Highway Commission with which he has been connected for several years, to become vice-president of the Hartford Sand & Stone Co., Hartford, Conn. He will be associated with James H. Cooke, president of the company, who was formerly vice-president and superintendent of the Connecticut Quarries Co. of New Haven. Mr. Thornton will attend to the sales and office management of the business of the Hartford Sand & Stone Company with offices at No. 703 Main Street.

Ben Haislip, who for the past four years had been connected with the Chicago office of the United States Rubber Co. as sales engineer, on January 1, 1920, joined the sales organization of the Traylor Engineering & Manufacturing Co., of Allentown, Pa. Mr. Haislip who, from 1904 to 1905, was with the Allis-Chalmers Co., and from 1905 to 1916 with the Power & Mining Machinery Co., will be connected with the Chicago district office, 1414 Fisher Bldg., of the Traylor Company in the capacity of sales engineer and assistant to L. J. Hewes, District Manager.

OBITUARY

D. P. McKinnon, formerly of Finch, Ont., and widely known throughout Canada, died at Calgary, on November 30, aged 71 years. He has been prominently connected for many years with the portland cement industry at Ottawa and Calgary.

Retail Dealers

The **John McCaffrey Co., Inc.**, of Philadelphia, Pa., has been incorporated to deal in builders supplies. The capital is $17,500. J. T. McCaffrey is president and general manager.

The McGucken Construction Co., Milwaukee, Wis., has been incorporated to manufacture cements, building materials, quarrying, and do construction work. The capital stock is $25,000 and the incorporators are John Soerig, R. J. Morawetz, R. McGucken.

The Shope Brick Co. of Wisconsin, Milwaukee, Wis., has been incorporated to manufacture brick and deal in building material. The capitalization from 5,000 shares of stock at no par value is not to exceed $25,000. The incorporators are R. J. Borth, E. G. Brown, R. S. Wittle, all of Milwaukee, Wis.

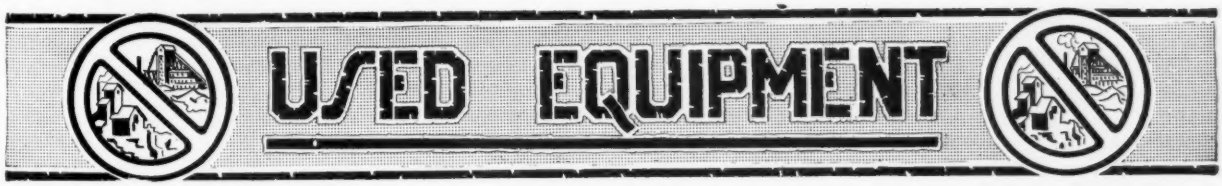
The North Shore Ice Co., Racine, Wis., has been incorporated to deal in ice, lumber, brick, stone, lime and all other building materials. The capital is $75,000 and the incorporators are Conrad Fox, F. A. Baumann and L. J. Quinn.

The Lar-Bru Construction Co., Milwaukee, Wis., has been incorporated to deal in cement, concrete, stone, brick and all other building materials. The capital is $25,000 and the incorporators are Edward Larson, Josephine Larson and G. L. Brun.

Phosphate

The Standard Wholesale Phosphate Co., Continental Bldg., Baltimore, Md., will build a reinforced concrete factory building at Curtis Bay, Md., which will cost $60,000.

According to a report made by Professor William Peterson, geologist for the state board of equalization, to the board, there are seven miles of exposure of a syncline of phosphate deposits in Rich county, Utah state, and five miles of crop line syncline exposures of phosphates can be traced for about 15 miles. The phosphate occurs in a vein about 90 feet wide, but is considered rich enough to mine, under present conditions, for a width of only about five and a half feet. Calculating the entire exposure, there would be approximately 90,000,000 tons of such phosphates. On the claims already filed, and estimating the commercial mining limit at 300 feet, there would be about 13,000,000 tons of phosphate.



Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid in advance of insertion.

FOR SALE

Slightly used No. 2 Jeffrey Junior Lime Pulverizer.

AIR REDUCTION SALES CO.
31st and Homan Chicago, Ill.
Telephone Lawndale 6513

New—RAILS—Relaying

All sections on hand for quick shipment. Reasonable prices quoted. Our stock is very complete.

M. K. FRANK
Frick Building Pittsburgh, Pa.

FOR SALE

Gates No. 6 Style "K" crusher.
42"x16' Gates screen.
40' No. 6 elevator.
1000' of ¾" steel cable.
450' of 1½" steel cable.
2 Gates No. 7 Ball mills.
3 Rotary driers.
2 Thew revolving steam shovels.
Air compressors, 200' to 2000' capacity.
Dragline 70' boom, 2½-yd. bucket.
Cars, Locomotives, Derricks, etc.
3 Williams Pulverizers.

DONAHUE & COMPANY
20 W. Jackson St. Chicago

FOR SALE

150—Elevator buckets, ten gauge steel 24" x10"x13½" for 26" elevator. These buckets are warranted to be in first class second-hand condition and are offered for sale because no longer needed, our method of elevating material having been changed to belt conveyor.

THE CARMICHAEL GRAVEL COMPANY
Williamsport, Ind. St. Louis, Mo.

USED EQUIPMENT

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid in advance of insertion.

STONE CRUSHERS

Need one, large or small? We are headquarters for good "used" machinery of this character. At present our holdings consist of nearly 100 different sizes—Gyratory Crushers from No. 2 to No. 21, Jaw Type from 8x14" to 60x84", also several Symons Disc and Crushing Rolls.

Let us know your requirements and you will hear from us by return mail. Inquiries also solicited for:

Locomotive Cranes, Steam Shovels, Locomotives, Cars, Rails, Hoists, Cableways, Compressors, Etc.

Wm. B. Grimshaw Co., 1048 Drexel Bldg., Phila., Pa.

Dealers in USED but NOT ABUSED Machinery

FOR SALE

20—Crushers, Nos. 2 to 10, mostly Gates.
2—327 HP. W. T. boilers, 180 lbs. $9.50 HP.
9—150 HP. 125 lb. H.R.T. boilers, butt strap.
1—No. 10K Gates Manganese fitted crusher.
1—No. 4 crushing plant, motor drive.
1—No. 3 crushing plant, engine drive.
2—48"x12' Taylor Manganese screens.
25—Air compressors, 60 to 4000 cu. ft.
50—Steam engines, 30 to 1500 HP.
1—95 HP. Loco. type boiler. Ill. ship.
75—Steam and Centrifugal pumps.
1—30-60 HP. Emerson-Brantingham tractor.
1—Yd. concrete mixer (side load).
Send us your inquiries for electrical equip., engines, hoists.

Ross Power Equipment Co.
Indianapolis, Ind.

FOR SALE

Fifteen ton Erie Full Revolving Shovel. Three-quarter yard dipper. Excellent condition.

Wisconsin Granite Company
Lumber Exchange **Chicago, Ill.**

Repaired Contractors' Equipment

Steam Shovels

Model 60 Marion Shovels, 2½-yard dippers, Nos 1999, 2059

Locomotives

1—14 x 20" standard gauge saddle tank Locomotive.

2—American 10 x 16" Locomotives, 36" gauge, with butt joint boilers

4—18-ton 10 x 16" Dinkeys, 36" gauge

Cableway

1—Lidgerwood Cableway, 1164-ft. span, with 9 x 10" DC Reversible Link Motion Cableway Engine, 3-ton capacity

We have a large stock of thoroughly repaired Construction Equipment of all kinds ready for immediate shipment.

Clam Shell Buckets

1—1-yard type "E" Blaw

1—1½-yard Browning.

Cars

20—12-yard Western Air Dump, standard gauge, 26 ft. bed.

26—12-yard Western air-dump standard gauge cars, 19' bed.

Hoisting Engines

1—8½ x 10 DC 2-D Lambert, with boiler

1—6 x 10" DC 2-D Byers.

1—6¼ x 10 DC 2-D Mundy, with attached swinger and boiler

H. KLEINHANS COMPANY

Union Arcade **Pittsburgh, Pa.**

CLASSIFIED ADVERTISING

Rates for advertising in the Classified Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid in advance of insertion.

Plants For Sale

FOR SALE

Best Gravel property in the State of Michigan, containing over twelve million yards of excellent material. Practically no over-burden. Lake and Railway on property. Good car supply. Small bank run plant with siding now on property. Lowest freight rate to Detroit and Toledo.

Box 1360 Care Rock Products

RARE OPPORTUNITY

A very choice tract of White Silica Sand Land, for sale, in the Ottawa, Illinois, district. Best of railroad facilities. Ninety foot vein; 99 per cent pure. Very light stripping. Enough said. Address.

Box 1359 Care of Rock Products

Glass Sand Property for Sale

25 acres high grade glass sand, 50 acres engine and building sand, on Southern Railway, Lumber City, Ga. The present company is supplying the leading glass factories of the South.

HINSON SAND MINES
Mrs. A. H. Mobley, Mgr. Lumber City, Ga.

FOR SALE

An interest in one of the largest deposits of No. 1 feldspar, comprising 100 acres, in North Carolina. Demand growing daily. Contract for entire output guaranteed. For full particulars write

O. L. SUGGETT
128 Woodrow Avenue Asheville, N. C.

Partners Wanted

PARTNER WANTED

to help finance a large Washed Sand and Gravel Plant. Good market guaranteed. Two hard roads will be built this year. Good railroad rates and facilities.

Box 1353 Care of Rock Products

Situation Wanted

A 100 per cent Efficient quarry and rock crusher plant, gravel and sand pit superintendent, offers his expert services; 25 years of continuous practical experience; able to handle any big proposition and deliver maximum quantity at minimum cost, on a salary or tonnage basis.

Address Mr. A. P., Box 1358, care Rock Products, 542 South Dearborn Street, Chicago, Ill.

Wanted

Position as superintendent or manager scientific wash sand and gravel plant or quarry; thoroughly experienced in all details of management and production; first-class executive; location immaterial; available immediately.

Box 1356 Care of Rock Products

SITUATION WANTED

Superintendent desires engagement where thorough knowledge of operation is essential for economical production; thorough knowledge of heavy blasting and efficient upkeep of machinery. References. Address

Box 1351 Care of Rock Products

WANTED

Position as manager or superintendent crushed stone quarry. Experienced in the installation and operation of heavy equipment, selecting and handling help, production, marketing, traffic problems, quarry cost accounting, and analyses of costs and records. Address

Address Box 1357 Care Rock Products

POSITION WANTED

as superintendent. Have had twenty years experience in sand and gravel washing plants, handling centrifugal pumps and all kinds of machinery. Can furnish best of references as to ability.

Box 1352 Care of Rock Products

Miscelaneous

WANTED

Everyone who has a truck will be interested in our free booklet, "Truck Tire Insurance." It tells how Giant Trip Traction Equipment makes trucks 100% efficient. We want you to write for it today.

CHALLONER COMPANY, Dept. T 19
Oshkosh, Wis.

Help Wanted

Dynamite and Drill Foreman Wanted

For crushed granite operation. Permanent position. Constant operation. Do not apply unless you send references as to ability and character, and unless you are an expert in laying out and shooting shots in hard granite or trap for crushers. Will pay expenses of right man here for conference.

THE WESTON & BROOKER CO.
Columbia, S. C.

WANTED

Experienced brick manufacturer to take charge of a brick plant. Going concern making very high-grade brick. Will only consider a party who can take a part interest in plant. Good salary and reasonable amount of stock given to right party. This is an opportunity for development. Plant has an everlasting supply of high-grade shale and a permanent market established for its product. Anyone answering this inquiry must state past experience and advise just when they could take charge. Address inquiry to

Box 1361 Care of Rock Products

WANTED

A superintendent to take charge of a large crushing plant in Illinois. Must be up to date and a little ahead. State age, experience and salary expected. Address

Box 1354 Care of Rock Products

WANTED

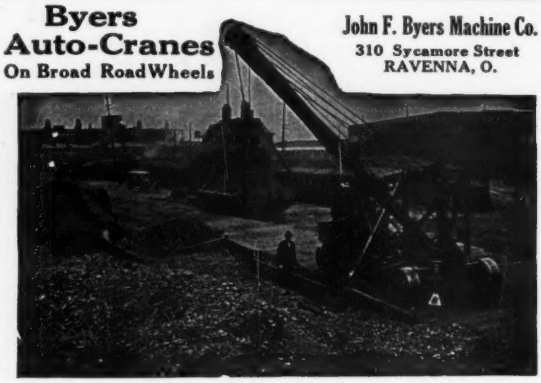
Man to take charge of new gravel pit; familiar with the handling of crude oil engines and 8-inch centrifugal pump. Address

Box 1355 Care of Rock Products

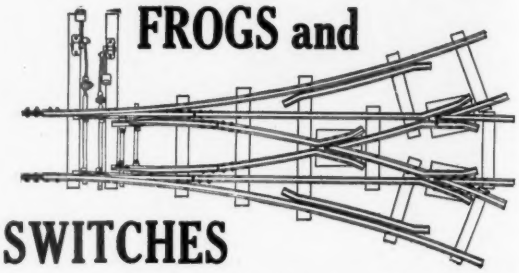
You are reading this ad. So are others. That is why it will pay you to advertise in these columns.

Byers Auto-Cranes
On Broad RoadWheels

John F. Byers Machine Co.
310 Sycamore Street
RAVENNA, O.



FROGS and SWITCHES



The Central Frog & Switch Co., Cincinnati, O.
Frogs, Switches, Crossings, Switch Stands, Rails, Angle Bars, Fishplates, Throws, Rail Braces, Tie Plates, Portable Track, Etc., Etc.

SCREENS of All Kinds

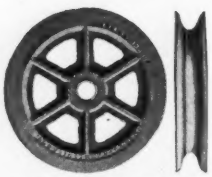
Chicago Perforating Co.
2445 West 24th Place
Tel. Canal 1459 CHICAGO, ILL.

We Design and Equip Complete Plants

for the manufacture of gypsum products, such as wall plaster, moulding plaster, wall board products, gypsum block products, also mixing plants.

We are prepared to furnish complete machinery-equipment and design and furnish plans for the installation. Consult our Engineering Department. Forty years' experience in designing of wall plaster machinery and plants.

The J. B. Ehrsam & Sons Mfg. Co.
Engineers, Machinists and Founders
Enterprise, Kansas



STOP
THE INTERRUPTION
→ INCREASE ←
THE PRODUCTION
of Your Plant By Installing
SUPERIOR NON-ROP-WER SHEAVES

They reduce rope wear to a minimum. Save power and insure safety. *Increases Hoisting Efficiency.* They cost no more than ordinary sheaves. Write for booklet today.

Mayer-Hasseldiek Mfg. Co.
Main, Wash and Commercial Sts. St. Louis, Mo.

OWEN SAND HANDLING BUCKET

BACON-FARREL ORE & ROCK CRUSHING-WORLD KNOWN ROLLS-CRUSHERS

EARLE C. BACON, INC. ENGINEERS
26 CORTLANDT ST., NEW YORK

WEBSTER
Elevating and Conveying Machinery

For rock, ore, coal and grain handling and for the movement of materials in bulk or packed. Literature and engineering estimates on request.

WEBSTER MFG. CO., Tiffin, Ohio
NEW YORK BOSTON CHICAGO

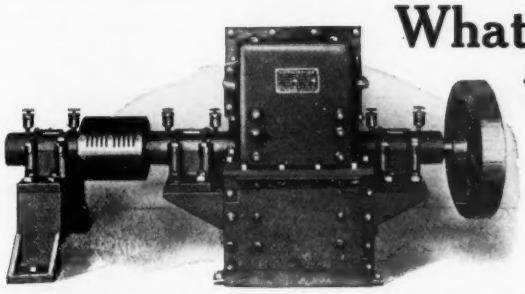
PERFORATED STEEL SCREENS

The success of any house supplying repair and renewal parts depends on furnishing what is needed quickly and correctly, and of satisfactory quality.

Sixteen years in the Perforated Metal field have given us the experience, equipment and technical knowledge, and three hundred tons or more of Steel Plates and Sheets enable us to fill rush orders promptly.

Try us with your next order.

Cross Engineering Company, Offices and Works, Carbondale, Pennsylvania



Whatever you want to crush there's a "K-B" for the Job

Let us tell you what the

K-B PULVERIZER

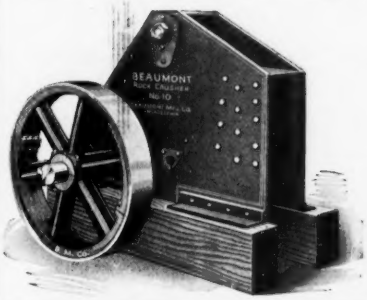
is doing to solve crushing problems similar to your own. Uses less power and built to last.

Ask us for facts and figures.

K-B PULVERIZER COMPANY, Inc., 92 Lafayette St. NEW YORK

K-B PULVERIZER

BEAUMONT ROCK CRUSHERS



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The biggest value for your money. Universal crushers and pulverizers reduce stone to desired size or fineness in a jiffy!
Fifteen years of designing and building experience have made possible the exceptional ability of Universals.

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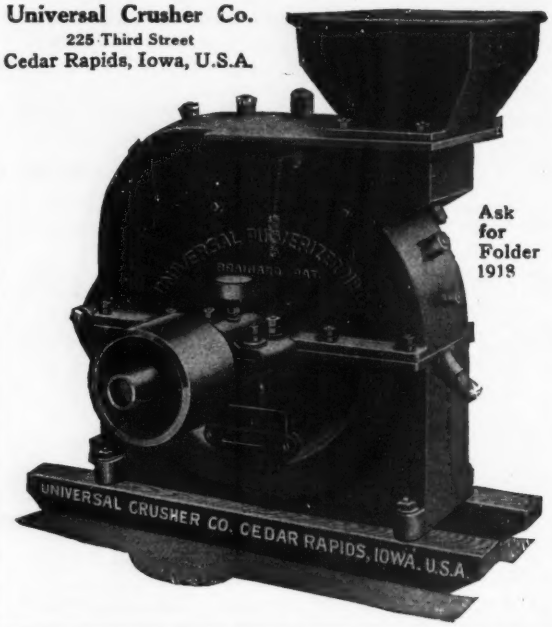

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They are unequalled for producing

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Reduces lump rock to 20, 40, 60, 80, 100 or 200 mesh. Requires no outside accessory equipment. Requires no overhead shafts, drives or screens. All material discharged from mill is finished product. No inside journals or bearings. No inside lubrication. Uniform feeding system. Constant and free discharge. Low installation cost. Low operating cost. Low lubricating cost. Dustless operation. Built in sizes to meet the requirements of your trade. Grinds rock to meet the specifications of all Agricultural Experiment Stations.

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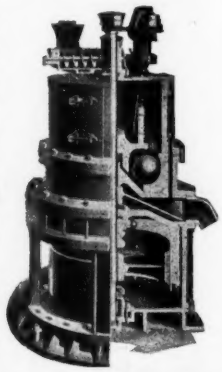

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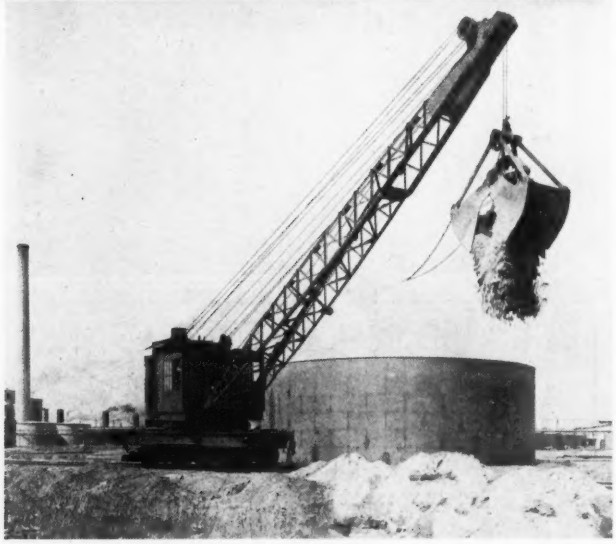

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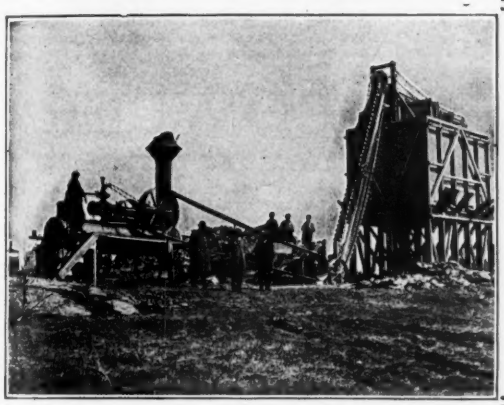

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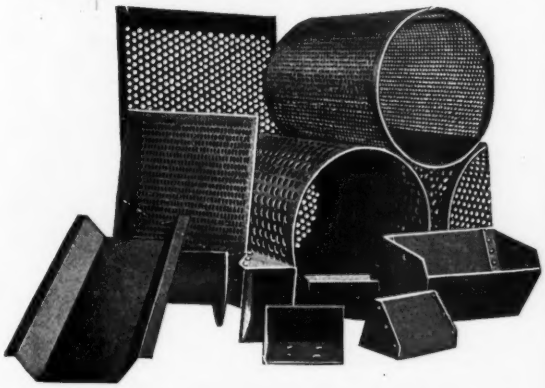

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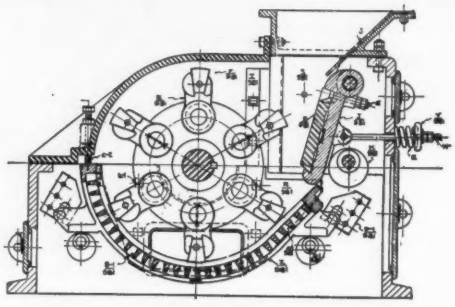
Swing-Hammer Pulverizer



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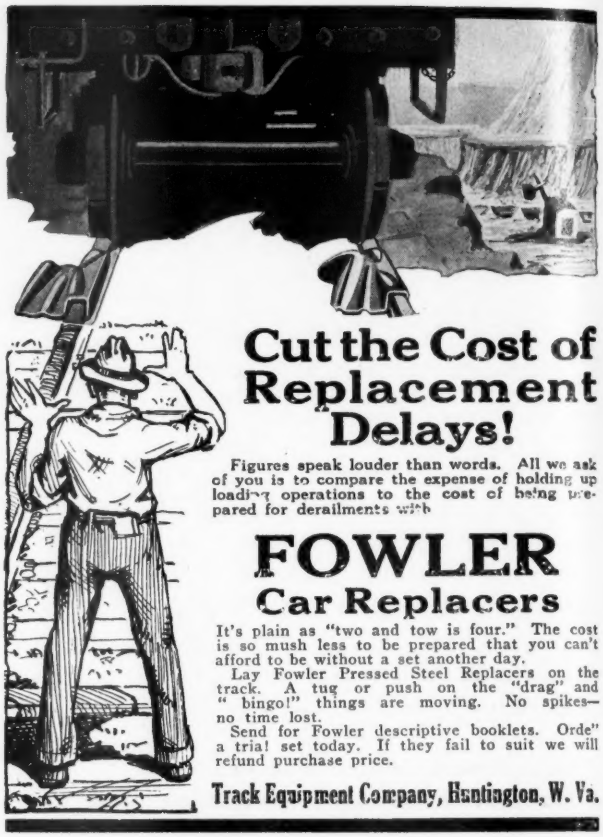

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Figures speak louder than words. All we ask of you is to compare the expense of holding up loading operations to the cost of being prepared for derailments with

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It's plain as "two and tow is four." The cost is so mush less to be prepared that you can't afford to be without a set another day.

Lay Fowler Pressed Steel Replacers on the track. A tug or push on the "drag" and "bingo!" things are moving. No spikes—no time lost.

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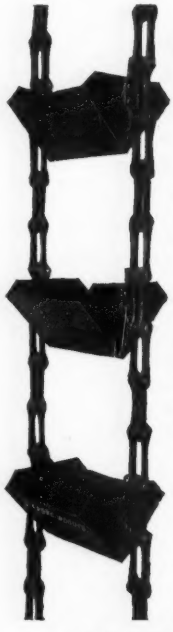

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Can be modified to fit your plant and will repay their costs many times in the saving of time and labor. The G-W way of handling Crushed Stone is endorsed by big plant owners and managers all over this country. Our large force of engineers is entirely at your service — right *now* if you're ready. We'll show you *where* you can save—*how much* you can save—and actually *install* G-W Equipment for you.

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The Leading Screen in

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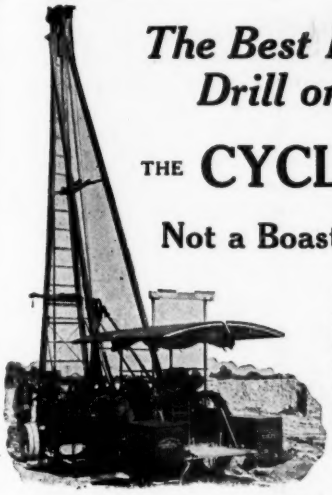

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Not a Boast—A FACT

We will prove the superiority of the No. 14 Drill by placing one of the outfits in your quarry against any or all other makes.

If the Cyclone doesn't out-drill and out-wear all other drills, we will remove it from the work without cost to you.

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Operation of the ERIE shovel is very simple. Only three levers. Experienced shovel operators prefer to work on an ERIE.

"Now use 500 lbs. less coal, and only one man"

"We are delighted with our ERIE Shovel. It digs daily 350 cu. yds. of sand and gravel, with one man both operating and firing; and using about 500 lbs. of coal.

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When required, the ERIE Shovel gives 500 to 600 cu. yds. of gravel per day, or more. Also very efficient for loading rock—the ERIE is built far stronger than the usual standard of steam-shovel construction.

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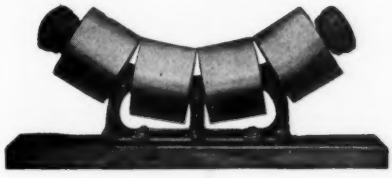

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Simple—Economical

will solve your handling problem. Simple in design, economical of power, they give the utmost satisfaction. Our forty years' experience has made us thoroughly familiar with the many details of construction necessary to success.

A rough sketch showing the conditions to be met at your plant will bring our recommendations. We should also know the capacity desired and the power available.

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Elevating, Conveying and Power Transmitting Machinery

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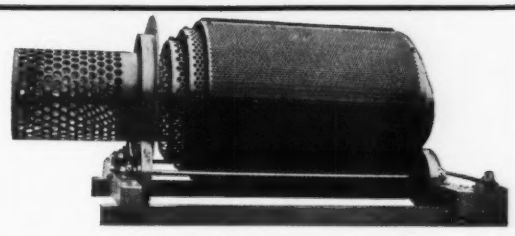
CYLINDERS
DUST JACKETS

Made to Fit All Makes and Sizes of Revolving Screens



The O'Laughlin Screen (Patented)

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CONICAL SCREENS
EVERYTHING IN SCREENS

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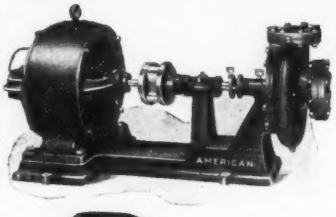
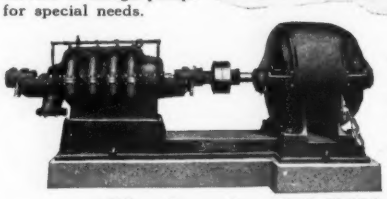
PUMPS

Combine High Efficiency With Low Maintenance Cost

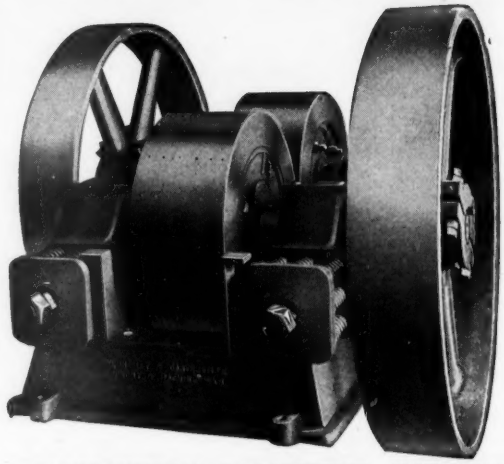
American Centrifugal Pumps are characterized by superior design, excellence of material and skillful workmanship. Fifty standard types to select from and a staff of engineers at your service to design pumps for special needs.





Catalog 149 describes Centrifugals and Catalog 130A the Deep Well Plunger Pumps.

The American Well Works
General Offices and Works, Aurora, Ill.
Chicago Office, First National Bank Building



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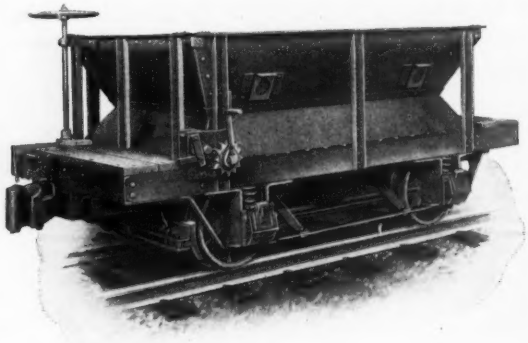

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CARS—every type—that's all we make.

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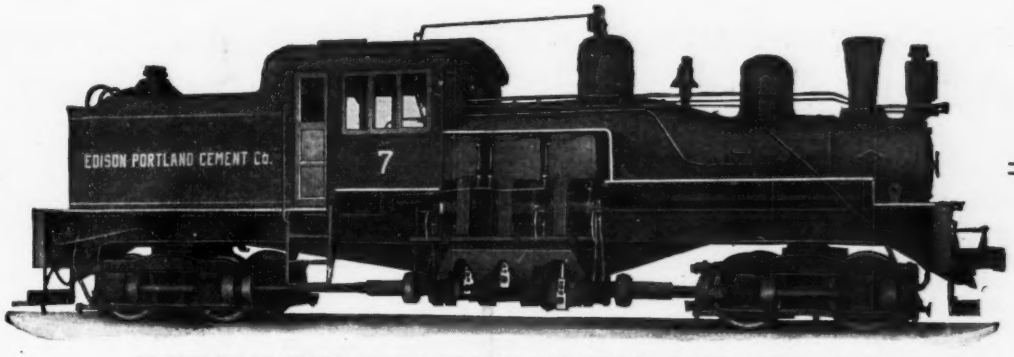

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"Shays" in Quarry and Gravel Pit

Around rock crushers there is always grit and dust in the air.

"SHAYS" are far ahead of rod engines for rock crusher service, because they have fewer exposed wearing parts that dust and grit will cut.

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"SHAY" locomotives in crusher service do more work per day than rod engines can do and cost less to maintain.

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Continuous Lime Hydrators

AUTOMATIC operation delivers lime by **weight,** not volume, to the Schaffer Hydrator. Automatically, water, too, is added in correct proportion—insuring a continuous flow of a superior product.

The flexibility of control enables the use of either high calcium or dolomite lime, while at the same time the automatic operation of Schaffer Hydrators solves the labor problem, as they require but little attention.

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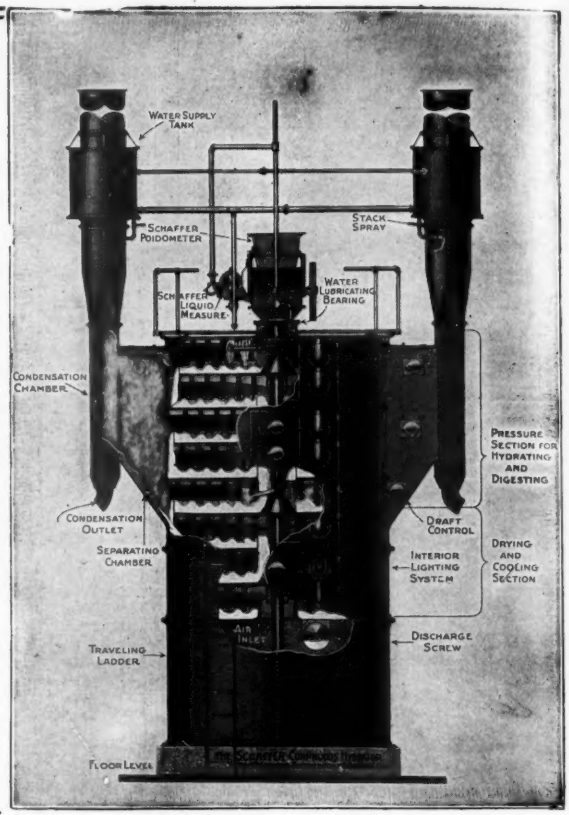
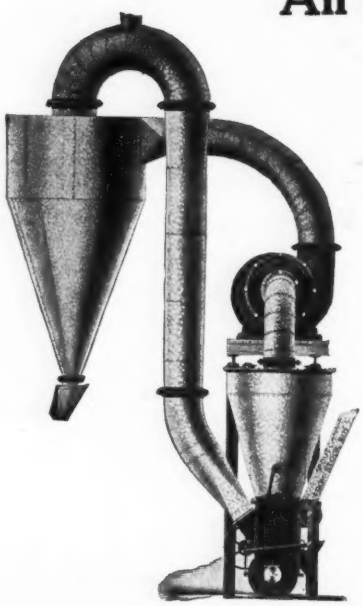


Producing a Pure Hydrated Lime that Doesn't Blister on the Walls Is the Ultimate Object of All Lime Manufacturers



There is only one sure and economical method to do this and that is by using the

RAYMOND PULVERIZING AIR-SEPARATING SYSTEM

With the Raymond System you get all of your handling machinery, from Hydrator to finished product, in one. It takes the Hydrate direct from the Hydrator; eliminates such impurities as core, sand, and unburned lime, automatically; air separates the product, producing uniform material; and delivers it to a storage bin from which it is bagged.

Consider the total first cost, operating cost and troubles you have with your present grinding and screening equipment against one unit which handles your material from Hydrator to bins.

Then write us for information about the Raymond System which has become the standard in many lime plants.

Raymond Bros. Impact Pulverizer Company

Western Office: 201 Boston Bldg., Denver, Colo.

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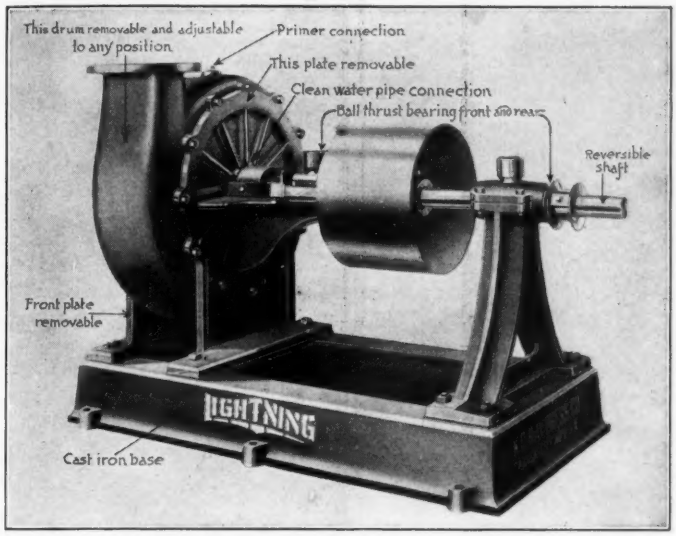
The Lightning Sand Pump



The ideal pump for sand companies and contractors—easy to operate, easy to adjust, easy to replace parts.

Write for Prices and Full Information

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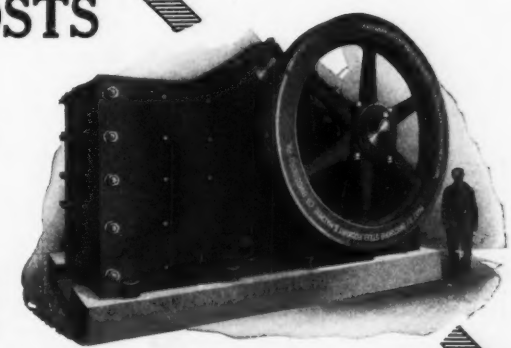
Address Pump Dept.

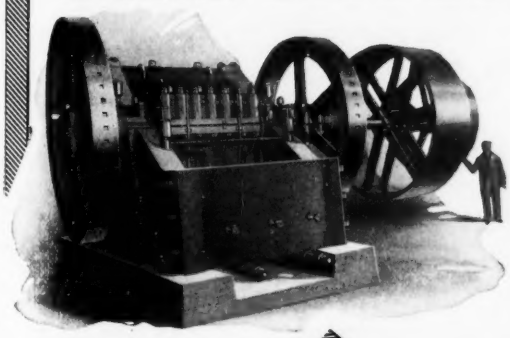
Kansas City Hay Press & Tractor Co., Kansas City, Mo.

REDUCE CRUSHING COSTS

with a Buchanan. They are simply constructed, yet are massive and rugged. Effect the most dependable efficiency possible and the greatest saving in cost of producing.



BUCHANAN ALL STEEL ROCK and ORE CRUSHERS



The figures show two general designs built for preliminary crushing. Made in standard sizes 60x84″, 48x72″, 48x60″, 42x72″, 42x60″, and 42x54″.

On the hardest rock or ore these machines will make a six-to-one reduction. That is, the size 60x84″ will receive rock measuring approximately 60″ in thickness and will reduce same to 10″ and under, with the usual amount of fine material. The other sizes reduce in the same ratio, according to their respective sizes, and the quality of material.

Let us help you arrive at the best size and type of Buchanan Crusher for your work—24 sizes, from 66x84″ to 24x36″.

We will send catalogs. Write us.

C. G. BUCHANAN CO., Inc.

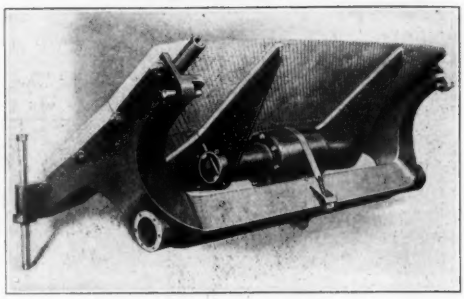
90 West Street **New York**

Crushing Machinery, Crushing Rolls and Magnetic Separators

The New, Revolutionary Development in Screening

The Mitchell Electric Vibrating Screen

—Forces the Meshes Up Into the Material 3,600 Times a Minute



The Electric Vibrator—the distinguishing feature of the Mitchell Electric Vibrating Screen — sets the entire screen cloth vibrating, and each vibration drives the meshes **upward** and **into** the material.

When you understand that this moving force—these vibrations—strike the material with an impact of from 500 to 1000 pounds at a frequency of 3600 per minute and that the motion of the screen cloth is ROTARY, you can readily appreciate the violent agitation produced, and consequently the huge tonnage that can be handled with absolute thoroughness in the screening.

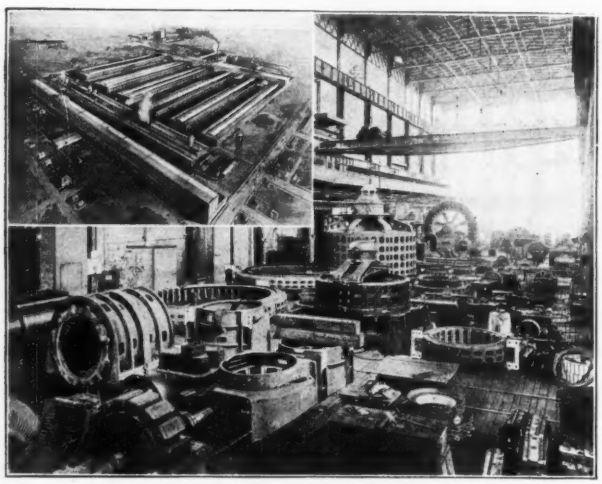
In coarse or fine, wet or dry screening, you will find the Mitchell unequalled in capacity, in thoroughness of screening and in economy of operation.

Send for Illustrated Booklet on the Mitchell

Manufacturers and Sole Agents

Stimpson Equipment Co.

315 Felt Building Salt Lake City, Utah



Interior view of Electrical Section of Erecting Shop

This building is 1157 feet long and is one of 14 buildings comprising the West Allis Plant, shown in insert

Ability to Deliver the Service Required

The consistently efficient and dependable performance of Allis-Chalmers Products in all lines of industry, under the severest conditions of operation, assures the purchaser of the satisfactory service of any Allis-Chalmers Product wherever installed.

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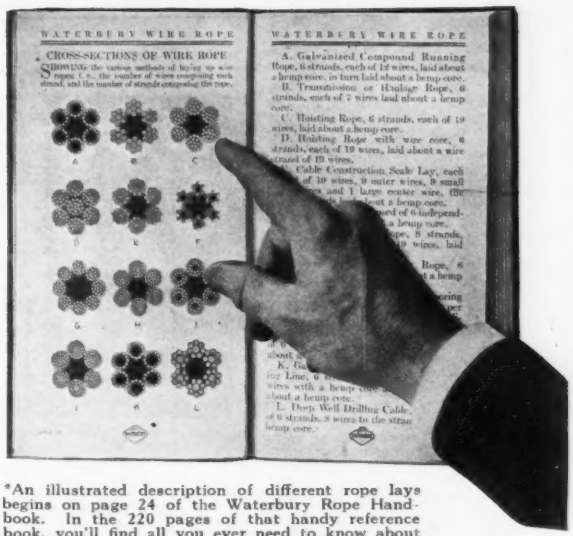
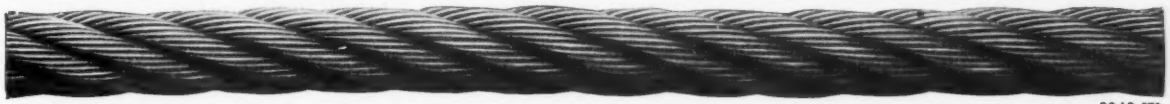


*An illustrated description of different rope lays begins on page 24 of the Waterbury Rope Handbook. In the 220 pages of that handy reference book, you'll find all you ever need to know about rope. Ask for a copy. It's free.



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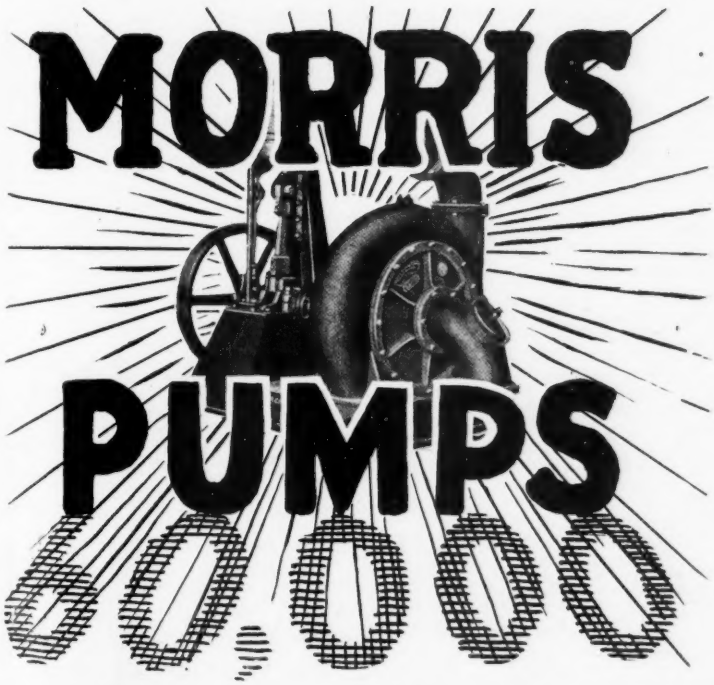
MORRIS PUMPS



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Jaite Company, The, Jaite, Ohio.
Urschel-Bates Valve Bag Co., Toledo, Ohio.

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Cincinnati Rubber Mfg. Co., Cincinnati, Ohio.
Goodyear Tire & Rubber Co., Akron, O.
Main Belting Co., Philadelphia, Pa.
New York Belting & Packing Co., New York City.

BIN GATES
Beaumont Mfg. Co., Philadelphia, Pa.

BINS, STORAGE
Weller Mfg. Co., Chicago, Ill.

BLASTING SUPPLIES
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Atlas Powder Co., Philadelphia, Pa.

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Stephens-Adamson Mfg. Co., Aurora, Ill.

BUCKETS
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Browning Co., Cleveland, Ohio.
Marion Steam Shovel Co., Marion, Ohio.
McMyler Interstate Co., Cleveland, Ohio.
Owen Bucket Co., Cleveland, Ohio.

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Butterworth & Lowe, Grand Rapids, Mich.

CAR REPLACERS
Track Equipment Co., Huntington, W. Va.

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Stephens-Adamson Mfg. Co., Aurora, Ill.

CLAY PRODUCTS
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Jeffrey Mfg. Co., The, Columbus, Ohio.
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Smith Eng. Works, Milwaukee, Wis.
Stephens-Adamson Mfg. Co., Aurora, Ill.
Sturtevant Mill Co., Boston, Mass.
Universal Road Mach. Co., Kingston, N. Y.
Webster Mfg. Co., Tiffin, Ohio.
Weller Mfg. Co., Chicago, Ill.

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Browning Co., Cleveland, Ohio.
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Chisholm-Moore Mfg. Co., Cleveland, Ohio.
McMyler-Interstate Co., Cleveland, Ohio.
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Ohio Locomotive Crane Co., Bucyrus, Ohio.
Osgood Co., The, Marion, Ohio.

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Buchanan Co., Inc., C. G., New York City.
Bradley Pulverizer Co., Allentown, Pa.
Butterworth & Lowe, Grand Rapids, Mich.
Chalmers & Williams, Chicago Heights, Ill.
Fuller-Lehigh Co., Fullerton, Pa.
Good Roads Mach. Co., Kennett Square, Pa.
Jeffrey Mfg. Co., The, Columbus, Ohio.
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Kennedy-Van Saun Mfg. & Eng. Corp., New York City.
Kent Mill Co., Brooklyn, N. Y.
Lewistown Fdry. & Mach. Co., Lewistown, Pa.
McLanahan-Stone Mach. Co., Hollidaysburg, Pa.
Pennsylvania Crusher Co., Philadelphia, Pa.
Raymond Bros. Impact Pulverizer Co., Chicago, Ill.
Smidth & Co., F. L., New York City.
Smith Eng. Works, Milwaukee, Wis.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Universal Crusher Co., Cedar Rapids, Iowa.
Universal Road Mach. Co., Kingston, N. Y.
Webb City & Carterville F. & M. Works, Webb City, Mo.
Williams Pat. Crush. & Pulv. Co., Chicago, Ill.
Worthington Pump & Mach. Corp., New York City

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American Hoist & Derrick Co., St. Paul, Minn.

DRILLS
Sanderson Cyclone Drill Co., Orrville, Ohio.
Wood Drill Works, Paterson, N. J.

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American Process Co., New York City.
Ruggles-Coles Eng. Co., N. Y. City.
Vulcan Iron Works, Wilkes-Barre, Pa.

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Worthington Pump & Mach. Co., New York City.

ENGINES, STEAM
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Bacon, Earle C., Inc., New York City.
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Buckbee Co., J. C., Chicago, Ill.
Fuller Engineering Co., Allentown, Pa.
Smidth & Co., F. L., New York City.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.
Yates, Preston K., New York City.

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Link-Belt Co., Chicago, Ill.
Marion Steam Shovel Co., Marion, Ind.

EXCAVATORS
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Sauerman Bros., Chicago, Ill.

FIRE BRICK
Robinson Clay Product Co., The, Akron, Ohio.

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Ensign-Bickford Co., Simsbury, Conn.

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Chapman Eng. Co., Mt. Vernon, Ohio.
International Clay Mach. Co., Dayton, Ohio.

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Stephens-Adamson Mfg. Co., Aurora, Ill.

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HOISTS
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Chisholm-Moore Mfg. Co., Cleveland, Ohio.
Vulcan Iron Works, Wilkes-Barre, Pa.

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Goodyear Tire & Rubber Co., Akron, O.
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Easton Car & Constr. Co., Easton, Pa.
International Clay Machine Co., Dayton, Ohio.
Watt Mining Car Wheel Co., Barnesville, Ohio.

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Steacy-Schmidt Mfg. Co., York, Pa.
Vulcan Iron Works, Wilkes-Barre, Pa.

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Gifford-Wood Co., Hudson, N. Y.
International Clay Mach. Co., Dayton, O.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Link-Belt Co., Chicago, Ill.
Stephens-Adamson Mfg. Co., Aurora, Ill.

LOCOMOTIVES
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Fate-Root-Heath Co., Plymouth, Ohio.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Lima Locomotive Works, New York City.
Porter Co., H. K., Pittsburgh, Pa.
Vulcan Iron Works, Wilkes-Barre, Pa.
Whitcomb Co., Geo. D., Rochelle, Ill.

MANGANESE STEEL
American Mang. Steel Co., Chicago, Ill.

MOTORS, ELECTRIC
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Pierce-Arrow Motor Car Co., Buffalo, N. Y.

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Goodyear Tire & Rubber Co., Akron, O.
N. Y. Belting & Packing Co., New York City.

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Hendrick Mfg. Co., Carbondale, Pa.
Johnston & Chapman Co., Chicago, Ill.
Nortmann Duffke Co., Milwaukee, Wis.

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PORTABLE STONE BINS
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Worthington Pump & Machine Co., N. Y. City.

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Morris Mach. Works, Baldwinsville, N. Y.

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Beaumont Mfg. Co., Philadelphia, Pa.
Cross Eng. Co., Carbondale, Pa.
Gifford-Wood Co., Hudson, N. Y.
Hendrick Mfg. Co., Carbondale, Pa.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Johnston & Chapman Co., Chicago, Ill.
National Engineering Co., Chicago, Ill.
Smith Eng. Works, Milwaukee, Wis.
Stephens-Adamson Mfg. Co., Aurora, Ill.
Stimpson Equip. Co., Salt Lake City, Utah.
Sturtevant Mill Co., Boston, Mass.
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Robinson Clay Product Co., The, Akron, Ohio.

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Bucyrus Company, Milwaukee, Wis.
Marion Steam Shovel Co., Marion, Ohio.
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Victor R. Browning & Co., Cleveland, Ohio.

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Stephens-Adamson Mfg. Co., Aurora, Ill.
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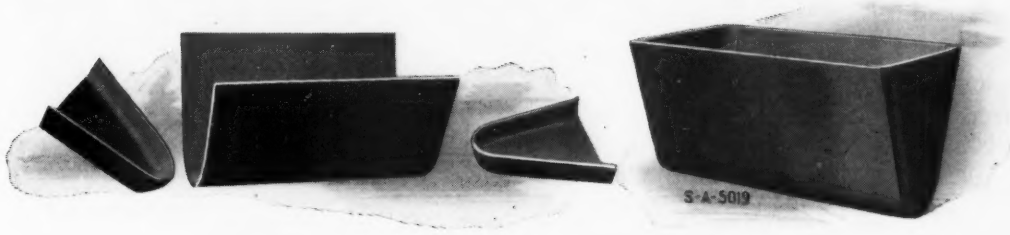

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	9x5	16x6	14x7	18x8		Heavier gauges and odd sizes made up specially if required
	10x6	18x6	16x7	20x8		

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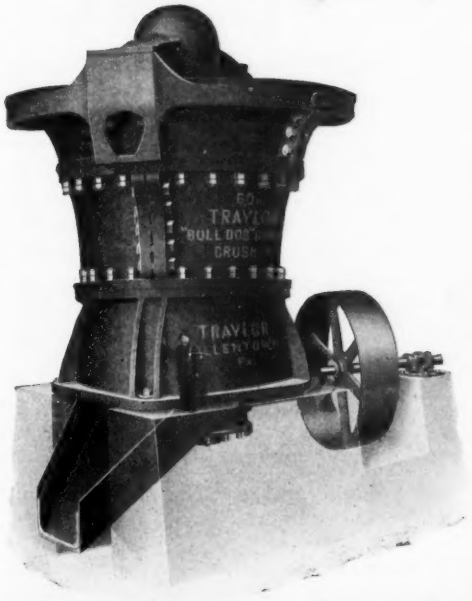

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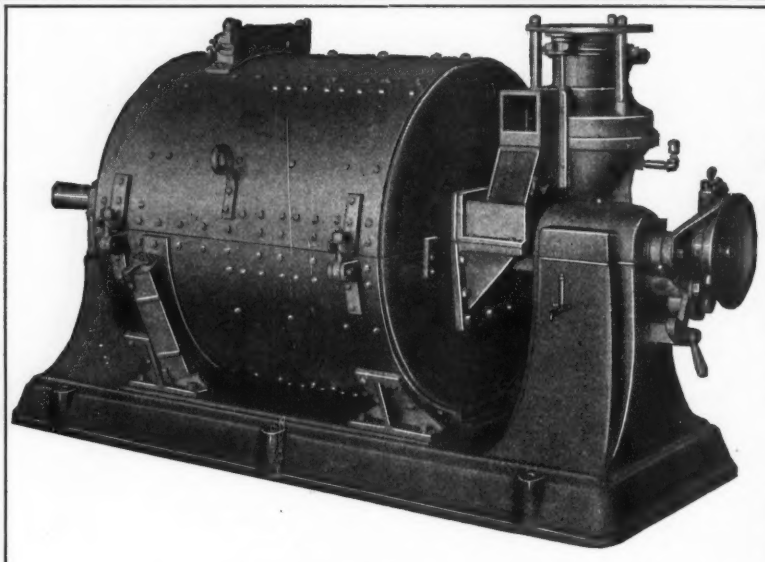

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Complete equipment for supplying pulverized coal to metallurgical furnaces, cement and lime kilns, to dryers and to all furnaces requiring a regular temperature and a quality of flame under prompt, easy control.

The AERO makes practicable the highest efficiency obtainable from coal. It makes it burn like a gas, producing at will a wide range of temperatures, a flame, the physical and chemical character of which is regulable — one that may be elongated or shortened, made oxidizing, reducing or neutral, as occasion may require.

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